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# Amateur Radio

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## COMMUNICATIONS & TECHNOLOGY

SEPTEMBER 2003

CQ

**Major Changes at WRC-03: Code Tests and 40 Meters**

**CW Results: 2002 CQ World Wide DX Contest**

**First Look: 60-Meter Propagation**

**CQ Reviews: SGC SG-2020 ADSP² Transceiver**

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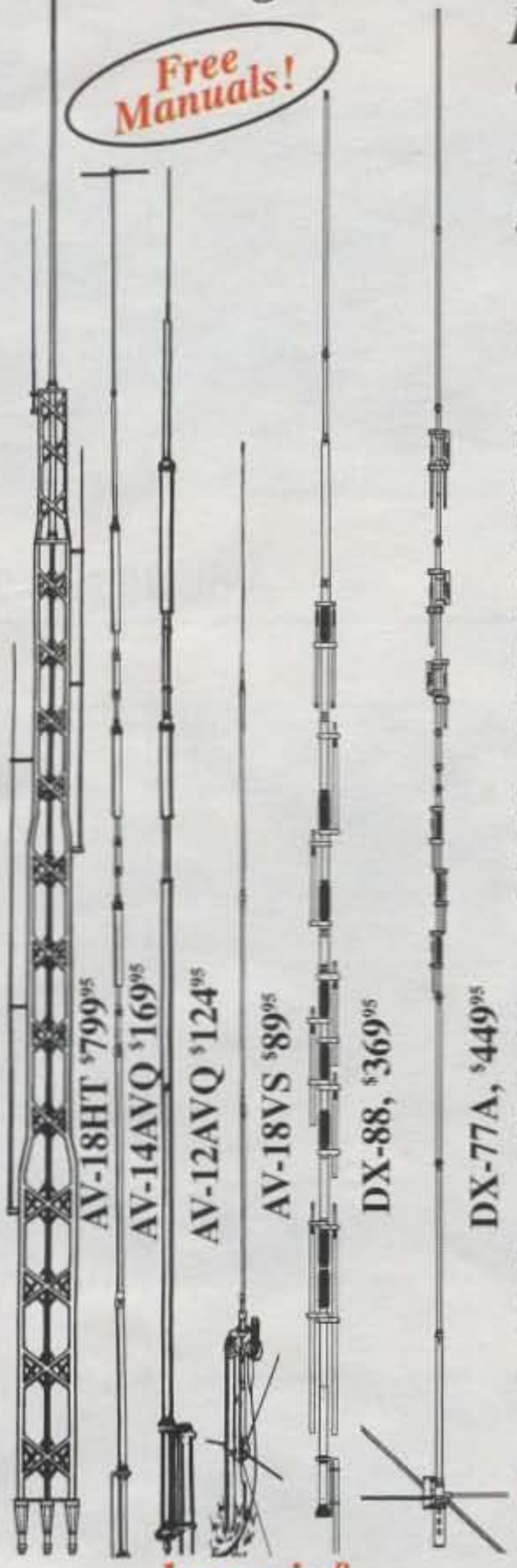


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| AV-12AVQ | $134.95 | 10/15/20 M | 1500 W PEP | 13 feet | 9 pounds | 80 MPH | 1.5-1.625" |
| **AV-18VS** | **$89.95** | **10 - 80 M** | **1500 W PEP** | **18 feet** | **4 pounds** | **80 MPH** | **1.5-1.625"** |
| DX-88 | $369.95 | 10 - 40 M | 1500 W PEP | 25 feet | 18 pounds | 75 mph no guy | 1.5-1.625" |
| **DX-77A** | **$449.95** | **10 - 80 M** | **1500 W PEP** | **29 feet** | **25 pounds** | **60 mph no guy** | **1.5-1.625"** |

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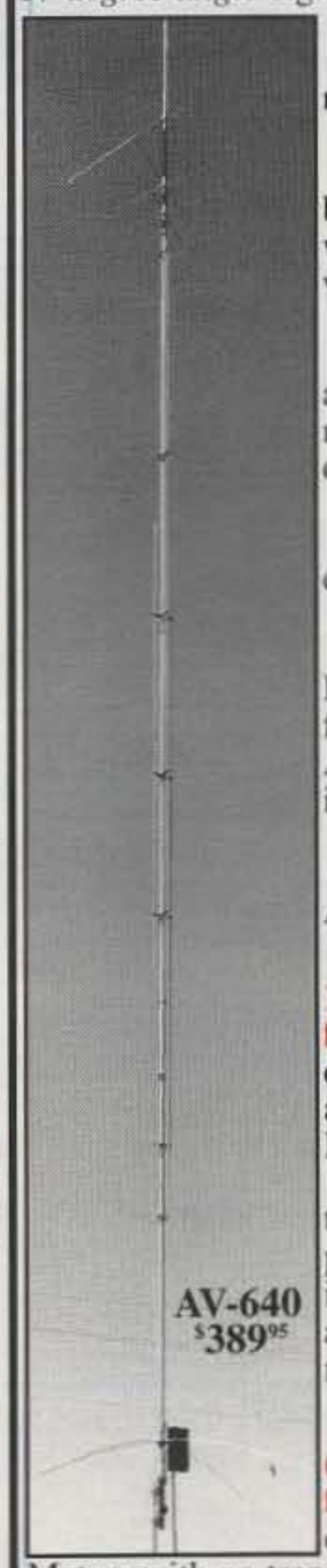


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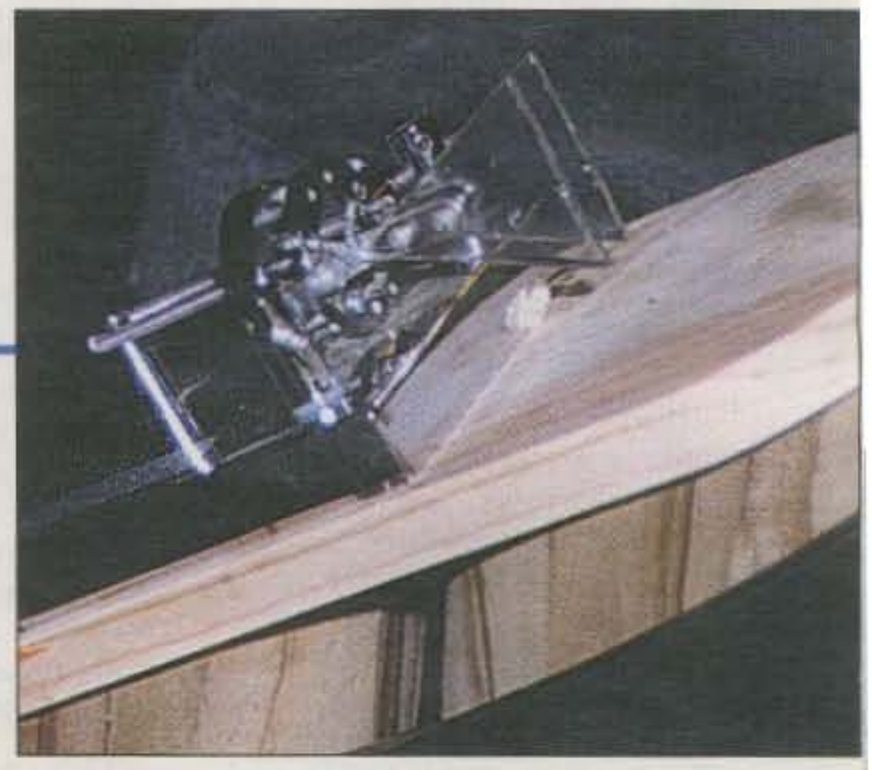


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[1]Note that certain frequencies are unavailable. [2]5W output

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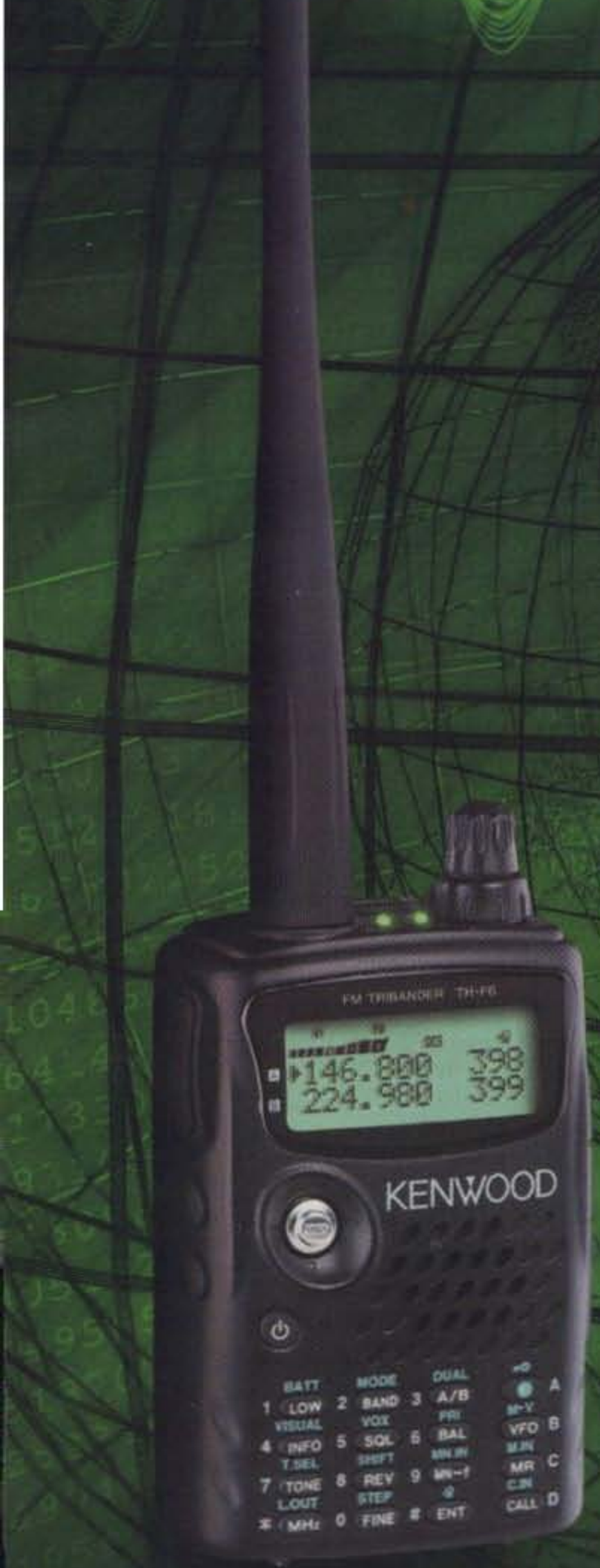


NEW

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# ham radio news

## Significant Changes for Ham Radio at WRC-03

The 2003 World Radiocommunication Conference in Geneva, Switzerland brought several significant changes to international ham radio regulations. First, the 7100–7200 kHz frequencies on the 40-meter band will be cleared of international broadcasters by 2009 and will be open to radio amateurs worldwide.

In another major change, the International Telecommunications Union voted to drop the Morse code exam requirement for all hams operating below 30 MHz. Code test requirements, or lack thereof, will now be made on a country-by-country basis. Switzerland may be the first country to change code requirements, according to *Newsline,* which reports that the Swiss say they will grant HF operating privileges to all hams with non-code licenses. *Newsline* also reports that the UK may soon do the same.

For more information on WRC-03, see our summary article on page 11 of this issue and "Washington Readout" on page 30.

## FCC Pre-empts Zoning Rule on RFI

The FCC has invalidated a portion of Anne Arundel County, Maryland's zoning ordinance on a finding that it attempted to regulate radio frequency interference (RFI), which is an area regulated exclusively by the federal government. In a case involving two wireless phone companies and interference to the county's 800-MHz public safety communications system, the FCC said "the challenged provisions of the County's Ordinance regulate RFI, not traditional zoning functions, and therefore are preempted by federal law." However, it also required all parties to work together to resolve the interference issues and to report back to the Commission in 30 days, and again in 90 days, to report on their progress.

## ARRL Files Strong Opposition to BPL

Calling Broadband over Power Lines "a Pandora's Box of unprecedented proportions," the ARRL has called on the FCC to "take no steps" to allow the proposed system of using power lines for high-speed internet transmission. The 120-page filing in response to the FCC's Notice of Inquiry on the subject was, according to the *ARRL Letter,* one of 1900 replies submitted. In its comments the League cited potential for interference both to and from amateur radio, noting that the potential remains untested and unrealized, since no BPL systems are currently in operation. However, several studies included with the League's comments suggest a worst-case increase in noise levels on HF and low VHF bands would be on the order of 34–65 dB above typical ambient noise levels. The *ARRL Letter* also noted that power-line interference is already a significant problem for amateurs and that some power companies have "a less-than-stellar record of cooperation" in resolving these problems. Comments on the FCC's Notice of Inquiry closed on July 7.

## California Antenna Bill Now Law

California Governor Gray Davis has signed into state law a bill incorporating the FCC's limited antenna preemption rules, commonly known as PRB-1. Under the new law, the *ARRL Letter* says, any California ordinance regulating amateur radio antenna structures must "reasonably accommodate" amateur radio communications and must constitute "the minimum practicable regulation to accomplish the legitimate purpose of the city or county." California is the 20th state to adopt a state version of the federal rule. It is particularly significant because it is the nation's most populous state and home to more amateurs (about 15% of the total) than any other U.S. state.

## Echolink Keeps Hurricane Center, Texas Hams, Connected

Traditional ham radio communications during Hurricane Claudette in Texas in July were augmented by an Echolink connection keeping key players in constant contact. According to the *ARRL Letter,* the Nacogdoches Amateur Radio Club used Echolink to tie together coastal repeaters, the National Hurricane Center, the National Weather Service, the Texas Department of Public Safety, and most coastal emergency operating centers. Club spokesman Tim Lewallen, KD5ING, said that at the height of the storm there was "almost constant" activity on the link, mostly between the National Hurricane Center and ham spotters providing real-time, first-hand reports.

In Arizona, where wildfires burned throughout June and July, hams in Navajo County set up repeater links to allow contact between the Red Cross communications center and an evacuation center, as it seems the cell phones provided by the Red Cross wouldn't work on the local wireless phone system. One June fire wiped out repeater relay links on Mount Lemmon, Arizona for both the Zia Connection and the Cactus Intertie, both wide-area linking networks.

## FCC Seeks Comments on Wide SSB Petition

Two hams who want the FCC to ban so-called "enhanced SSB" will have the opportunity to hear what the rest of the amateur community feels about the idea. According to *Newsline* and the *ARRL Letter,* the FCC has assigned a rule-making number, RM-10740, to its petition to limit SSB bandwidth to 2.8 kHz and AM bandwidth to 5.6 kHz, and was accepting comments on the proposal through July 26.

## FCC Establishes Office of Homeland Security

The FCC has created an Office of Homeland Security within the Enforcement Bureau. According to *Newsline,* it will be the Commission's focal point for emergency-related issues, including those involving amateur radio. Among the responsibilities of the new office is that of declaring temporary communications emergencies, as was done in the case of Hurricane Claudette in June.

## W6JAY Named Young Ham of the Year

Seventeen-year-old Jay Thompson, W6JAY, has been named the Newsline Young Ham of the Year for his excellent performance in hidden transmitter hunts as well as his service in emergency communications and recruitment of new radio amateurs. He has competed in three championship transmitter hunts and has won nearly all of the medals available in his age group. One of these hunts was a world championship competition in China in 2002.

Jay is also active in emergency communications. He is a member of the Orange County (California) Hospital Disaster Emergency Communications Group, and got his first experience with real disaster aid in 2002, helping to run a station at the hospital after a train crash. Jay has done recruitment work on his own and through the Boy Scouts of America. He believes that the future of amateur radio lies with young people.

CQ Communications is a corporate co-sponsor of the Newsline Young Ham of the Year Award.

*Additional and updated news is available on the Ham Radio News page of the CQ website at <http://www.cq-amateur-radio.com>. For breaking news stories, plus info on additional items of interest, sign up for CQ's free online newsletter service. Just click on "CQ Newsletter" on the home page of our website.*

## *NEW* from Kuranishi Instruments LTD, Japan

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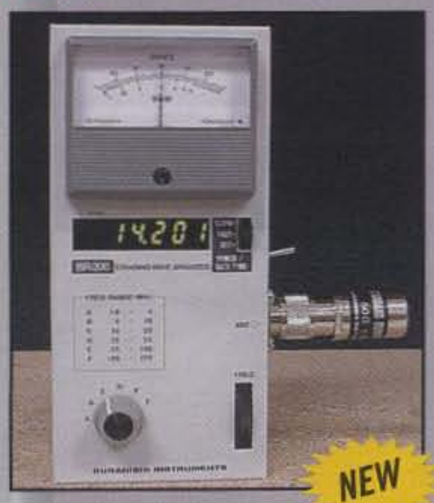


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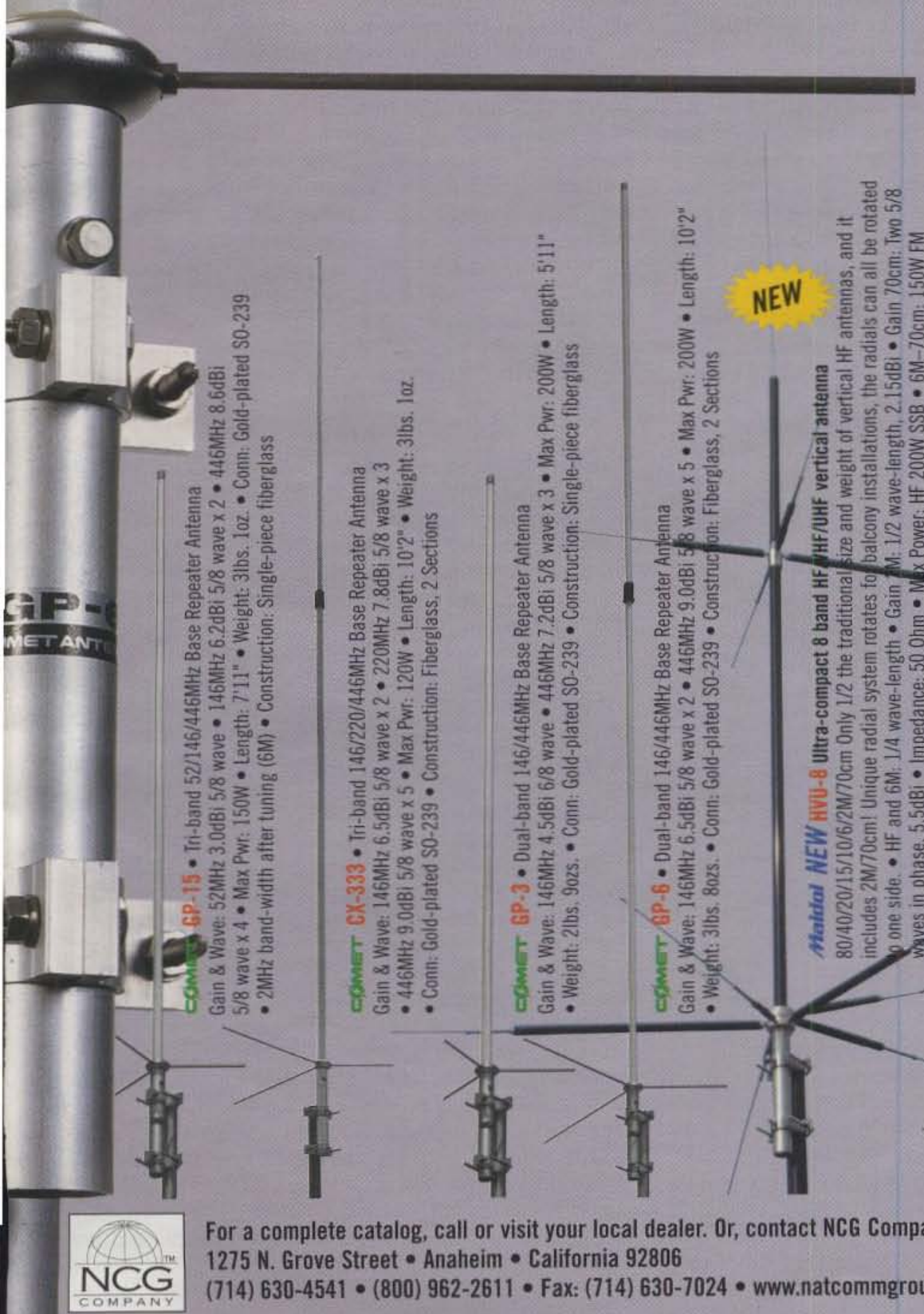

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**COMET CX-333** • Tri-band 146/220/446MHz Base Repeater Antenna
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**COMET GP-3** • Dual-band 146/446MHz Base Repeater Antenna
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BY RICH MOSESON, W2VU

# WRC and Me (and You)

Before I do anything else, I want to correct and apologize for an omission in last month's Zero Bias. In my listing of specialty magazines near the end of the column, I inadvertently left out "one DX magazine," a particularly embarrassing omission, since that magazine is edited and published by our own DX Editor, N4AA, and I read every issue. Sorry, Carl.

## Speaking of DX ...

Low-band DXers have a lot to look forward to a few years from now in terms of improved DX conditions on 40 meters. This has nothing to do with sunspots or the ionosphere, but rather a political decision in Geneva early this summer to open up an additional 100 kHz of the 40-meter band (7100–7200 kHz) to exclusive worldwide amateur use, allowing us to better enjoy the rich DX potential that already exists on the band. The change in allocation adopted by the 2003 World Radiocommunication Conference (see WRC-03 Summary article on page 11 and this month's "Washington Readout" on page 30 for details) won't take place until March of 2009—about 5 1/2 years from now. We hope that the FCC and other countries' telecommunications authorities will use the time to work with their hams to develop band plans that can be put into effect immediately when the new allocations take effect. The next sunspot cycle should be just starting its upward journey in 2009, so 40 meters should be prime DX territory at that time, since the higher bands will still be "hibernating." Doubling the size of the 40-meter band that's available to hams in Europe, Asia, Africa, and Oceania should provide an immediate DX bonanza.

Even here in the United States, where hams already have operating privileges on 7100–7200, there are questions that will need to be answered and sub-band allocation decisions that will need to be made. Right now, 7100–7150 is a CW-only Novice/Tech-with-code allocation, and 7150–7200 is reserved for Extra and Advanced Class hams only. How will Generals be able to benefit from the changes in other parts of the world? How will the virtual certainty of competing with DX stations using voice on 7100–7150 affect the ability of newcomers to the world of CW to make meaningful code contacts? We have five years in which to work out a fair and equitable rearrangement of the subbands on 40 meters to let as many hams as possible benefit from the historic change made by WRC-03. Let's use that time wisely to work with the FCC on developing the best possible plan.

## Two Big Code Questions

The other major action affecting hams at WRC-03 was the decision to replace the international code requirement for any ham who wants a license to operate below 30 MHz with a new provision leaving the code test question up to each individual country. This gives the FCC decisions to make on two issues:

1) Will it change the current code test requirements for General and Extra Class licenses? and

2) Will it permit currently-licensed hams who have not passed a code test (Technicians) to have operating privileges below 30 MHz? If so, what should they be?

When *CQ* spoke with Bill Cross, W3TN, at the FCC, he was pretty emphatic in his belief that the Commission would not act on its own on these questions. The question of code tests is much more important to hams than to the FCC, he said, adding, "that's up to you guys to figure out collectively what you want" and then to communicate it to the FCC through the rule-making process.

A few possible options are presented in this month's Reader Survey (we're not endorsing any of them at this point, just tossing them out for comment); I'm sure there are more, and most likely better, ones out there as well, and any decisions made on these issues need to keep in mind the 40-meter questions that will have to be answered in the not-too-distant future. I look forward to seeing what is proposed.

## A Change in Tone

Beyond these two matters, and other specific changes covered in our summary article and in W5YI's column elsewhere in this issue, there are two very important but less obvious changes apparent in the decisions regarding amateur radio made at WRC-03. These are, first, a change in the tone of the Radio Regulations from generally negative (you *may not* do this unless your government says you may) to generally positive (you *may* do this unless your government says you may not); and second, a move toward putting more decision-making in the hands of individual countries, as with the code test requirement. You can compare the old and the new versions of Article 25—the international rules regarding the amateur services—side-by-side in W5YI's "Washington Readout" column, which begins on page 30.

## A Worthwhile Obsession

The ARRL, along with other member societies of the International Amateur Radio Union (IARU), has invested a tremendous amount of high-level staff time and member dues over the past several years in preparing for this conference and in conducting behind-the-scenes negotiations that led to the compromises to which all the delegates at WRC-03 agreed. There was also a major effort to help persuade the members that this stuff was *really important*. Over the past year and a half, for example, nearly a third of the editorials in *QST* dealt in some way with the issues to be decided at WRC-03, with a special emphasis on attempts at worldwide "harmonization" of the 40-meter band. It almost seemed like it was becoming an obsession up there in Newington. But if it was, it was a worthwhile obsession—leading to fewer international restrictions on amateur radio operations, a generally more positive approach to amateur radio in the international Radio Regulations, and most significantly, a historic decision to move international broadcasters (for the first time ever) to accommodate the needs of another radio service—ours.

In our view, the time and money (mine included) were well spent. No matter what we may individually think of various ARRL people and policies, there is no other organization in amateur radio today that can successfully represent our collective interests both on the national stage (as on such issues as broadband over power lines) and on the world stage (as at WRC-03). We all owe a debt of gratitude to the ARRL and the members who support it.

73, Rich, W2VU



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# announcements

**AO-40 Birthday Bash** – AMSAT is sponsoring this event from 0000Z Sept. 16 to 0000Z Nov. 17 to celebrate AO-40's third birthday. Hams worldwide are invited to particpat and awards will be given. For more information, see <http://www. amsatnet.com/contest.pdf> or <http:www.amsatnet.com/contest.doc>, or contact Bruce Paige, KK5DO, P.O. Box 310, Alief, TX 77411. Logs must be received on or before Nov. 30, 2003.

**International Search and Rescue Competition** – ISAR 2003, sponsored by the Society of Newfoundland Radio Amateurs (SONRA) and the US Coast Guard Auxiliary, will be held in St. John's, Newfoundland Sept. 26–27 and highlights the role amateur radio can play in emergency preparedness.HF and VHF (via the Internet Radio LInking Project [IRLP]) stations will demonstrate the capability of amateur radio to link up local emergency organizations and to communicate with other emergency agencies around the world. For the event SONRA has access to four nodes, with VO1AAA #2360 and VO1CCG #2300 being the primary ones. Special event station VO1SAR will be on 7.275, 14.275, 21.375, and 28.400 MHz; exchange signal reports (no QSL route given). A coooemorative QSL will be available. For more information, see <www.ccga-gcac.org/isar2003>.

**Collegiate QSO Party** – Sponsored by the Collegiate ARA, 1200Z Sept. 20 to 0400Z Sept. 21, 160–10 meters (no WARC bands); open to hams worldwide. For details see: <http://www.qth.com/collegiate/qsopartycentral.htm>.

**The following Special Event stations will be on during Sept.:**

**Route 66 on the Air** (no calls given), 0000Z Sept. 6 to 2400Z Sept. 14 on 28.466, 21.266, 21.366, 14.166, 14.266, 7.266, 3.566 MHz (±QRM). For details see <www.qsl.net/w6jbt>.

**K1G**, from USCG and Canadian CG Auxiliaries anniversaries and ISAR 2003, Raymond, ME; 1300–2100Z Sept. 27 on 28.320, 21.310, 14.260, 7.260 MHz. For certificate QSL to Keith Morton, W1NDH, P.O. Box 809, Raymond, ME 04071-0809.

**K2K**, from USCG and Canadian CG Auxiliaries anniversaries and ISAR 2003, Long Island, NY; 1300–2400Z Sept. 27 on 10/15/20m. QSL via K2KGB with SASE; <k2kgb@arrl.net>.

**N2UL**, from CQ Labor Day, Great Fall Festival, Patterson, NJ; 1200–2400Z Sept. 1 on 28.420, 21.360, 14.260 MHz. For certificate QSL to RDGULARA, c/o WA2VJA, 112 Prospect St., Nutley, NJ 07110-0716.

**W2WTC**, in honor of those who perished 9/11/01; Pearl River DX Assn.; the month of September, phone only in General portion of the bands. QSL via the bureau or direct to K2HJB.

**K3G**, from USCG Auxiliary 64th anniversary, Philadelphia, PA; 1400–2200Z Sept. 27 on 7.270, 14.270, 21.330, 28.330 MHz. QSL with SASE to Daniel Amoroso, W3DI, 196 Dam View Dr., Media, PA 19063; <nnn0abp@navymars.org>.

**W3H**, from East Coast Hobo Gathering, Pennsburg, PA; 1400–2000Z Sept. 20 in General portion of 15/20/40 meters phone. For certificate send $2.00 and 9×12 SASE to PAARC, 1693 Farmington Ave., Pottstown, PA 19464-1345; <http://userweb.ot.com/ag3t/W3H.htm>.

**N4C**, from USCG Auxiliary 64th anniversary, Ruskin, FL; 1300–2100Z Sept. 27 on 7.230, 14.240, 21.320, 28.340 MHz. QSL to Michael Glennon, KB4JHU, 1503 Highcrest Circle, Valrico, FL 33594; <kb4jhu@arrl.net>.

**N4W**, from commemoration of wreck of the Old 97 train, Danville, VA; 1300–2300Z Sept. 27 on 3.897, 7.097, 7.297, 14.097, 14.297 MHz. QSL to Fred Fraley, W4DF, 213 Huntingwood Blvd., Lynchburg, VA 24503;<aa4ff@aol.com>.

**K5F**, from Vinita (OK) Fry Festival; 1400–2200Z Sept. 13 on 28.390, 14.310, 7.250, 3.910 MHz. For certificate send SASE to Patrick Murphy, P.O. Box 234, Big Cabin, OK 74332.

**W5SLA**, Ozone ARC celebration, Slidell, LA; 1400–2300Z Sept. 20 on 7.240 & 14.250 ±QRM. For QSL send SASE to OARC, P.O. Box 553, Slidell, LA 70459.

**W7PX**, from 198th anniversary of Lewis & Clark Expedition at Lolo Pass, Idaho County, ID; 1500Z Sept. 13 to 0200Z Sept. 15 on 7.265, 14.265, 21.365, 28.365 MHz. For certificate ($2.00) or QSL send SASE to HARC, P.O. Box 3811, Missoula, MT 59806-3811; <www.riversdreams.com/k7vk>.

**KB8UUZ**, from National POW/MIA Recogntion Day, Freedom Township, OH; 2000Z Sept. 20 to 2400Z Sept. 22 on 28.375, 21.325, 14.300, 7.240 MHz. For 8.5×11 certificate send SASE to Tom Parkinson, KB8UUZ, 9992 State Route 700, Mantua, OH 44255.

**W8B**, from Buckwheat Festival, Kingwood, WV; 1400Z Sept. 25 to 0200Z Sept. 28 on phone or CW 40/20/10 meters approx. 25 kHz up from bottom of General phone bands or Novice CW, plus 147.000 on 2 meters, PSK31 on 20/10 meters. For certificate send QSL and SASE to KA8UEU, P.O. Box 512, Kingwood, WV 26537.

**W8E**, from US and Candian Coast Guard anniversaries, Div. 5, 8ER, OH; 1300–2100Z Sept. 27 on 7.250, 14.250, 21.345, 28.350 MHz. QSL to D. F. Stroup, WB2JAU, 6095 Drumhill Lane, Milford, OH 45150.

**W8YAF**, from WAF Founders Day, Yankee Air Museum, Belleville, MI; 1200– 2000Z Sept. 21 on 7.270. For certificate QSL with 9×12 SASE to Frank Nagy, N8BIB, 24315 Waltz Rd., New Boston, MI 48164-9167.

**W9JOZ**, from Hoosier Valley Railroad Museum, North Judson, IN; 1300–2100Z Sept. 6 on 7.240, 14.240 ±QRM. QSL via Stark County ARC, 405 W. Jackson St., Knox, IN 46534.

**WØC**, from Sept. 11 commemoration, Kansas State Fair, Reno County, KS; 1600Z Sept. 11 to 0100Z Sept. 12 on 14.250, 21.350, 28.400. QSL to RCKARA, 1710 N. Adams, Hutchinson, KS 67502.

**VE3MIS**, from Halton Radial Railway Museum, Milton, Ontario, Canada; 1400–2000Z Sept. 27 & 28 on 7.227, 14.240, 21.315, 28.380 ±QRM. QSL to MARC, c/o Michael Brickell, VE3TKI, 2801 Bucklepost Crescent, Mississauga, ON L5N 1X6 Canada (U.S. stations send green stamp or IRC).

**The following hamfests, etc., are slated for September:**

Sept. 6, **Owen County Hamfest**, Spencer, IN. Contact Katie Smith, K9INU, 812-829-2140, or Carl Zager, 812-339-4437.

Sept. 6, **Greater Louisville Hamfest & Computer Show**, Bullitt County Fairgrounds, south of Louisville, KY. Contact Joe Pollack, K4ULW, 1-502-935-7197, e-mail: <k4ulw@aol.com>. (Talk-in 146.70; exams 10 AM to 1 PM)

Sept. 7, **LIMARC Outdoor Hamfair**, Briarcliffe College, Bethpage, NY. Contact Brian Gelber, WB2YMC, <hamfest@limarc.org>; <http://www.limarc.org/fest.htm>. (Talk-in 146.85- PL 136.5)

Sept. 12–13, **BCRO Hamfest**, Thomas Jefferson School, Bentonville, AR. Contact Betty Weiberg, 417-435-2332, e-mail: <jweiberg@leru.net>. (Talk-in 145.290 –600; exams Sat. 10 AM)

Sept. 13, **GRAHamfest 2003**, Forest Hills Northern High School, Grand rapids, MI. Contact Ed Novakowski, N8UXN, evenings 616-458-9029; e-mail: <hamfest@w8dc.org>; <http://www.w8dc.org/swap.htm>. (Talk-in 147.26+ [94.8 Hz], 146.52 simplex; exams 10 AM)

Sept. 13, **RAGS Hamfest**, Pompey Hills Fire Dept., Syracuse, NY. Info call 315-698-4558. (Talk-in 147.90/30 MHz; exams noon)

Sept. 14, **DVRA Hamfest**, National Guard Armory, Lawrenceville, NJ. Contact Glenn Costello, N2RPM, 609-882-2240, <abbott0903@hotmail.com>. (Talk-in 146.67PL 131.8)

Sept. 14, **Western Connecticut Hamfest**, Edmond Town Hall, Newtown, CT. Contact John Ahle, W1JMA, 203-438-6782, e-mail: <w1jma@arrl.net>. (Talk-in 147.300+ PL 100)

Sept. 14, **SEMARA Hamfest**, SE Massachusetts ARA Clubhouse, South Dartmouth, MA. Contact Tim Smith, N1TI, 508-758-3680, e-mail: <rt_smith@yahoo.com>; <www.semara.org>. (Talk-in 147.00/.60

Sept. 19–21, **Peoria Superfest**, Exposition Gardens Fairgrounds, Peoria, IL. Call 309-692-3378; <www.w9uvi.org>.

Sept. 20, **Lehigh ARC Hamfest**, Schnecksville Fire Dept., Schnecksville, PA. Contact Susan, <kb3idw@arrl.net, 610-797-1437; <http://www.dlarc.org>. (Talk-in 51.760, 146.700, 444.900 all PL 151.4)

Sept. 20, **Central Vermont ARC Hamfest**, Waterbury Armory, Waterbury, VT. Contact Tom Girardi, 802-476-3116, e-mail: <wa1ynu@pshaft.com>. (Talk-in 146.625–; exams 12:30 PM)

Sept. 20, **W9DXCC DX Convention & Banquet**, Holiday Inn, Rolling Meadows, IL. Contact Bill Smith, W9VA, 847-945-1564, e-mail: <w9va@aol.com>; <www.w9dxcc.com>.

Sept. 20–21, **Virginia Beach Hamfest**, Virginia Wesleyan College, Virginia Beach, VA. Contact e-mail <hamfest@exis.net>; <www.vahamfest.com>.

Sept. 21, **MIT Radio Societies' Hamfest**, MIT, Albany & Main St., Cambridge, MA. Contact Nick, KA1MQX, 617-253-3776 (9–5 M–F); <http://web.mit.edu/w1mx/www/swapfest.html>. (Talk-in 146.52, 449.725/444.725 –PL 114.8)

Sept. 26–28, **Microwave Update Conference 2003**, Seattle, WA. See <www.Mocrowaveupdate.org>.


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| Turning Power (in pounds) | 1000 | 800 | 600 | 350 |
| Brake Power (in pounds) | 9000 | 5000 | 800 | 450 |
| Brake Construction | Electric wedge | Electric wedge | Disc brake | Disc brake |
| Bearing Assembly/How many | Tripl race/138 | Dual Race/96 | Dual race/48 | Dual race/12 |
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- Mil spec 810, C/D/E*¹

### IC-V8 2M Transceiver
**Commercial Grade Rugged**
- 5.5W output
- 107 alphnumeric memories
- Customizable keys
- Auto repeater
- PC Programmable
- CTCSS encode/decode w/tone scan
- Drop-in trickle charger included

### IC-2100H 25N 2M Mobile Transceiver
- Cool dual display • 50 watts
- CTCSS encode/decode w/tone scan
- Backlit remote control mic
- Mil spec 810, C/D/E*¹
- Auto repeater
- 113 alphnumeric memories

### IC-W32A Dual Band Transceiver
- 2M, & 70CM @ 5W
- V/V, U/U, V/U
- Independent controls for each band
- 200 alphnumeric memories
- Auto repeater
- CTCSS encode/decode w/tone scan
- IRLP compatible

### IC-V8000 2M Mobile Transceiver
- 75 watts
- ICOM DMS scanning
- CTCSS/DCS encode/decode w/tone scan
- Weather alert
- Weather channel scan
- 200 alphanumeric memories
- Backlit remote control mic

### IC-T90A Triple Band Transceiver
- 6M/2M/70CM @ 5W
- Wide band RX 495kHz-999.999MHz**
- 500 alphnumeric memories
- Dynamic memory scan
- Backlit keypad & display
- CTCSS/DTCS encode/decode w/tone scan
- Weather Alert

### IC-2720H Dual Band Mobile
- 2M/70CM
- VV/UU/VU
- Wide band RX inc. air & weather bands
- Dynamic Memory Scan (DMS)
- CTCSS/DTCS encode/decode w/tone scan
- Independent controls for each band
- DTMF Encode
- 212 memory channels
- Remote Mounting Kit Included

### IC-208H Dual Band Mobile
- 55 watts VHF (2M), 50 watts UHF (70CM)
- Wide Band RX**
- 500 alphanumeric memories
- CTCSS/DTCS encode/decode w/tone scan
- Detachable remote head
- DMS w/linked banks

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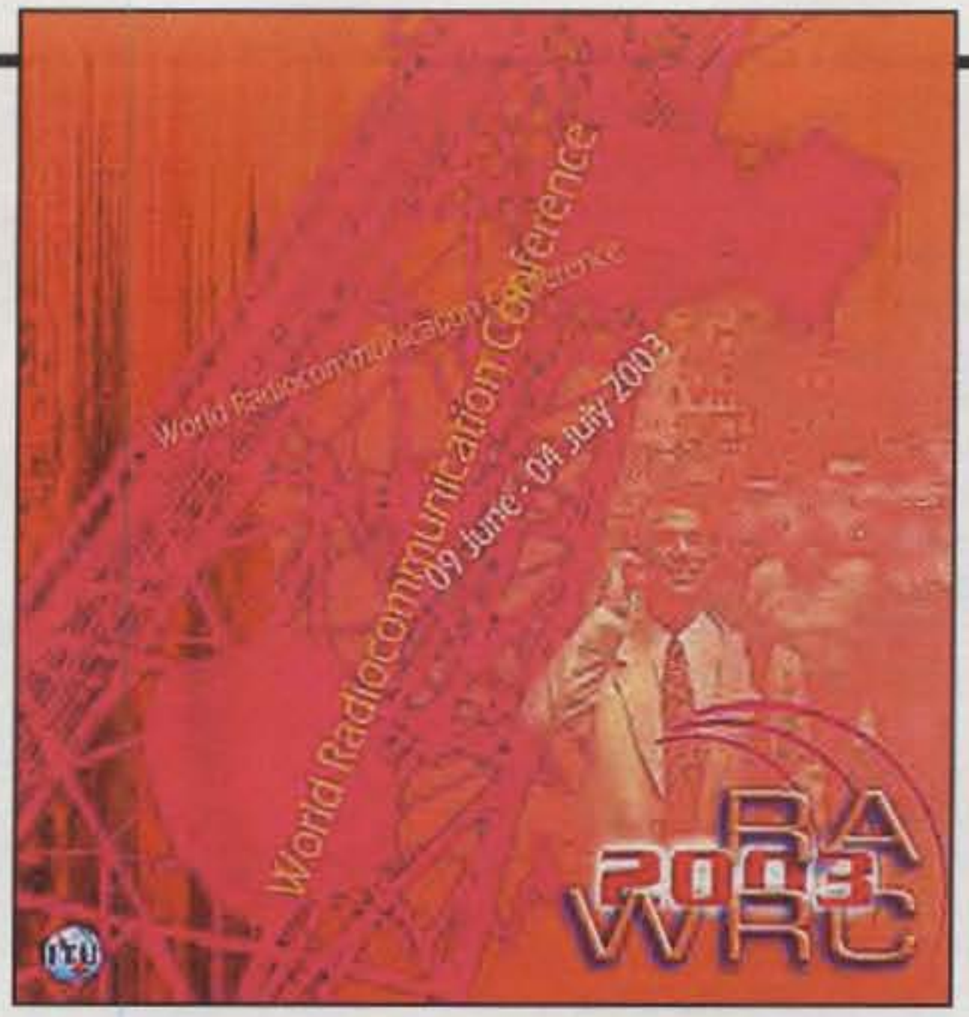
*The latest World Radiocommunication Conference is over. Morse code exams are no longer an international requirement for operating below 30 MHz. By early 2009, 7100–7200 kHz on 40 meters will be open to hams worldwide. What impact will the actions of WRC-03 have for hams in the United States?*




# WRC-03 A Summary and Look Ahead

**BY DAN MOSESON***

The debates at the 2003 World Radiocommunication Conference (WRC-03), which came to an end July 4th in Geneva, Switzerland, produced several changes in the international Radio Regulations that are of particular importance to radio amateurs. The changes, won through long periods of sometimes-intense deliberation, will increase the range of operating frequencies on the 40-meter band available to hams outside the Americas, leave Morse code requirements up to the judgment of individual countries, and revise and clarify old operating restrictions. The information on the decisions reached and changes made is drawn from news releases from the International Amateur Radio Union (IARU), which had observer status at WRC-03. Additional detail, background, and history may be found in this month's "Washington Readout" column.

## 40 Meters

The expansion of ham frequencies on 40 meters is a historic decision. The International Telecommunications Union (ITU) has decided that by 2009, it will remove all international broadcasters from 7100–7200 kHz, making those frequencies available to amateurs around the globe. This is the first time that the ITU has shifted HF broadcasting to accommodate another branch of radio, according to the IARU. By March 29, 2009, all HF broadcasters currently transmitting between 7100 and 7200 in Europe, Asia, Africa, and Oceania (ITU Regions 1 and 3) will move up to the 7200–7450 kHz range, and broadcasters in the Americas (Region 2) will have their current 7300–7350 allocation increased to 7300–7400 kHz. The 7100–7200 kHz segment will then be opened to hams in Regions 1 and 3. Hams in Region 2 will retain their operating privileges on 7000–7300 kHz, but will no longer have to compete with broadcasters in the 7100–7200 kHz range.

This gain for the ham world was hard-won. The IARU says many delegates at WRC-03 supported changes that were less significant and/or would have taken longer to go into effect. Others wanted no change in the range of ham frequencies. But all eventually agreed to the compromise outlined here.

## Code and Other Changes

In another decision that affects radio amateurs, the ITU has done away with the international Morse code exam requirement for all hams operating below 30 MHz. It will now be up to the administrations of individual countries to decide what, if any, type of code test must be passed to use these bands. For those who wish to operate below 30 MHz in the US, passing a 5-words-per-minute Morse code test is still mandatory. In an interview with *CQ* the FCC's Bill Cross, W3TN, noted that virtually none of the WRC's decisions *require* any action by the U.S. Cross said the Commission will not make any new ruling on the code issue until it is petitioned to do so. Morse code, he says, is important to hams, but not to the FCC, and the issue of code tests is really up to the amateur community to decide. "The process we have for determining that is our rule making process," Cross explained.

The delegates at WRC-03 also updated and revised old amateur operating restrictions. Third-party communication between different countries used to be prohibited unless a specific agreement existed between the two countries. That rule has been changed to allow each country to decide whether or not it objects to third-party radio traffic. Third-party contacts between countries with no objections would be permitted, and they will be legal between all countries to aid in emergency and disaster relief. In an additional change, the regulation encourages the communication administrations of countries to allow amateur radio operators to prepare for and aid in disaster relief.

**Editorial Intern*
*c/o CQ magazine*

Rules governing the various means of communication amateurs may use and the content permitted in their conversations have also been revised to better fit the current state of amateur radio. The regulation stating that ham communications had to be in "plain language" was changed to say that no ham communications could be encoded for the purpose of concealing their meaning, except in the case of satellite control stations. This ruling clears up questions concerning the legality of amateurs using certain digital modes in international communications. The same regulation had also originally limited the content of international amateur contacts to "messages of a technical nature relating to tests and to remarks of a personal character which, by reason of their unimportance, recourse to the public telecommunications service is not justified." This was with regard to casual messages considered so unimportant as to not be worth sending by telephone or telegraph. The rule has been reworded to limit content of amateur exchanges to "communications incidental to the purposes of the amateur service... and to remarks of a personal character." The broader definition should cover most of what hams generally talk about.

In another rule change relating to international ham contacts, the conferees altered regulations concerning reciprocal licensing—recognition of amateur licenses outside of the country that issues them. The text of the rule reads: "An administration may determine whether or not to permit a person who has been granted a license to operate an amateur station by another administration, to operate an amateur station while that person is temporarily in its territory, subject to such conditions or restrictions it may impose." According to Bill Cross, this does not necessarily apply to the United States. He explained that the Communications Act, which is the law under which the FCC functions, states that foreign hams must be licensed by their home countries before being allowed to operate in American territory. As an example, Cross said a German citizen licensed in France could not operate a ham station in the U.S. under the current law. WRC agreements, he said, don't change American laws, and any change in this rule would require legislation.

Another international rule change, intended to make the task of assigning amateur callsigns easier, was also made. The delegates voted to allow communications administrations to assign callsigns ending in suffixes of up to four characters, and ending with a letter. The prefix will be the nation's identification symbol and a single number. The new regulation also allows prefixes of more than four characters to be used temporarily for special events. Cross said this is a complex issue because of possible conflicts with callsigns issued to other services, but anticipates little impact on the average ham, since any possible change would apply only to special event stations.

A ruling was also made concerning satellite-borne synthetic aperture radars (SARs) on 70 centimeters. The conference decided to permit their operation on this band, but set limits to help minimize the possibility of interference to amateur weak-signal and satellite communications.

## Planning for 2007

Those who attended WRC-03 also started planning for the next World Radiocommunication Conference, which is tentatively set for 2007. Of the topics being discussed for the agenda of the 2007 conference, two are important to hams. The first issue is a call for a review of "the allocations of all services in the HF bands between 4 MHz and 10 MHz," with a few exceptions, such as the 7000–7200 kHz range, which was reorganized at WRC-03. Another possible issue is a proposal for limited amateur use of the 135.7–137.8 kHz frequencies. The FCC recently rejected a plan to allow U.S. hams to share this range of frequencies with (among others) utility companies, who use it for power line carrier communications (PLC). The power companies fear that ham communications would interfere with PLC signals that control the power grid, but this has not occurred in Europe, where the frequencies are already shared by hams.

In the view of the amateur representatives at WRC-03, the conference was beneficial to the hobby. "Good ITU compromises—and virtually every decision made here is a compromise— are sometimes described as leaving everyone equally unhappy," commented IARU Secretary and ARRL CEO David Sumner, K1ZZ. "Your Geneva team is tired and pretty happy."

Bill Cross of the FCC does not think that the changes will have a large overall impact on amateur radio in the U.S. American hams can already use the frequencies that will change hands in 2009, he noted, though they may then be able to do so with less competition from broadcasters. Any changes that might come about in reciprocal operating rules, he added, would affect foreign hams visiting the United States more than U.S. hams traveling overseas, and as for the code test question, Cross said, "that's up to you guys to figure out collectively what you want."

The conference members signed a copy of the *Final Acts of the Conference*, the completed list of decisions and rule changes, on July 4th. The changes to Article 19 and Article 25, which concern the Amateur Service, are effective as of July 5, 2003. Most of the rest take effect on January 1, 2005.

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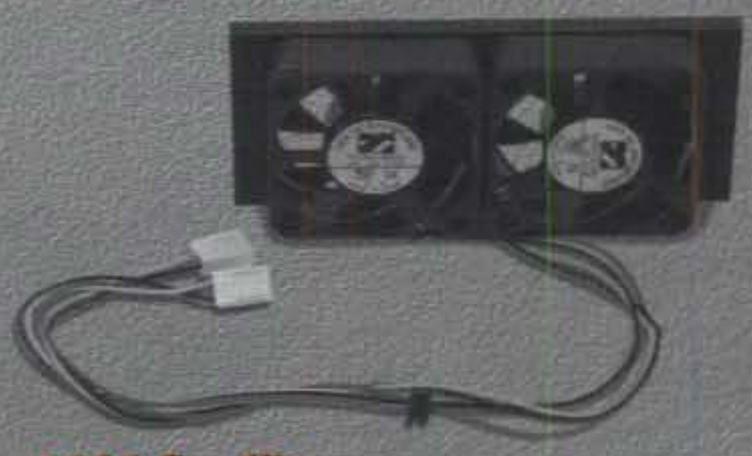

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# Results of the 2002 CQ WW DX CW Contest

**BY BOB COX,* K3EST**

**Expanded CQ WW Contest Results on the Web**

We've moved a few elements of our contest reporting onto the CQ website this year, including **Station Operators** of Multi-Op stations, **Top Scores in Very Active Zones**, and **Zone Leaders/Single Op**. In addition, we have expanded **QRM** on the web.

To view these additional and expanded elements of this year's CQ WW results, go to <http://www.cq-amateur-radio.com/cqwwhome.html>, then click on "Expanded results, 2002 CQ WW CW" and select the category you want to see. You may also get there by going to our home page at <http://www.cq-amateur-radio.com>, clicking on "Contest Rules & Info," then clicking on "CQ World Wide DX Contest" and selecting "Expanded Results, 2002 CQ WW CW."

With solar activity predicted not to cooperate for the full contest, the entrants of the 2002 CQ WW jumped into the fray. Bands that would have been mostly quiet on any other weekend suddenly came dramatically alive with activity. The old saying "the CQ WW makes its own propagation" rang true. New records were set and CW activity reached an all-time high. The effect of the solar activity did not discourage the contest fraternity.

When the last CW log arrived, a total of about 3800 logs had been received! That is a lot of "beep beep" contacts. Given the highly variable conditions throughout the world, the number of contesters taking to the airwaves to have fun and test out their stations points to contesting as being alive and well throughout the world.

Plenty of rare DX stations on the air for the contest made for many new countries for lots of contesters. Many contesters got into planes, cars, and boats and traveled to exotic places to hand out QSOs in the CQ WW. Those who stayed home—most of us—turned on the radio just before the contest to hear the exciting contest activity on all the bands. That special sound gets your adrenalin flowing and draws you in.

## High Power

It was not too difficult to work the P4 multiplier. For the first time in the CQ WW, the top three scores were from the same country—Aruba. The guys must have had a good time before and after the contest meeting for dinners and drinks. If you ever were worried that more than one station from a location would hinder your chances, this year's results proved there were a lot of people working Aruba. The world's top place went to perennial heavy hitter Jose, CT1BOH, operating from P40E. Jose showed his skill by winning by more than 3 million points. Second place world went to Scott, KØDQ, who keyed P40Q to 11 million points. Third place went to John, W2GD, operating at P40W.

In Europe the Iberian peninsula once again was the place to be. Timo, OH1NOA, keyed CT8T to the top-score position. Second place went to Chris, SP7GIQ, operating as SN7Q. Third place went to Dave, G4BUO.

Here in the USA the new champion was Dave, NT1N. Winning by over a million points in the US is not trivial. Dave made it happen as KT1V. Second place went to Randy, K5ZD/1, and third place went to Bob, KQ2M/1. The top scores from each continent were: North America 8P5A; Africa 6V6U; Asia A45XR; Japan JH5FXP; Europe CT8T; South America P40E; and Oceania T88JA.

## Low Power

Once again you had to point your beam south to work the top three low-power champions. With conditions over the pole occasionally tough, operating from southern latitudes made a lot of sense. Reprising his winning low power efforts, Joe, AA3B, keyed V26K to the world's top spot. He was followed by Con, DF4SA, at CT3EE and Carsten, DL1EFD, at PJ4W.

In the US Dan, K1TO/4, keyed/typed his way to new US record. Dan took full advantage of conditions to out-QSO all of his competitors. A FB second-place effort was accomplished by Marvin, N5AW, out in Texas. Third place went to Terry, N4TZ/9. It has been quite a while since the northeast US has been shut out of the top three.

Northeastern or southeastern Europe once again was the place to operate. First place was won by Andrius, LY2TA, at LY7Z. Second place went to Stefan, DL1IAO, and third place to Manuel, EA7RM. The top scores from each continent were: North America V26K; Africa CT3EE; Asia 4X6FR; Japan JH4UYB; Europe LY7Z; South America PJ4W; and Oceania KHØ/JK2VOC.

## QRP

Tuning up your rig to no more than 5 watts is all you have to do to enter the QRP category. The QRP category is a great place to improve your operating skills. As it turns out, many entrants in this category run much less than 5 watts. This year one entrant ran 1 milliwatt! It's fun to see what you can do with such low power. All three top QRP scores were from the Caribbean rim. The QRP world winner this year was Didier, FY5FY. Second place went to John, KK9A, operating P40A, and third place went to Philip, NØKE, at TI5N. We bet you worked all three. The top QRP man in the US was Tom, N4KG, followed by John, K1RC, and Bill, N8ET. Gary, W9XT, and Frank, W6JTI, did a great job from the west. In Europe Bosko, YT7TY, took the crown home by beating DL3KVR and Tom, SP6AYP.

Both JA6GCE and Valery, UA9AMF, did an outstanding job. Top scores from each continent were: North America TI5N; Africa CT9M; Asia JA6GCE; Europe YT7TY; and South America P40A (Oceania no entrant).

## Assisted

Repeating his world high victory of last year, Frank, DL2CC, traveled down to CT9M again. Fresh off his high finish in WRTC 2002, Frank took advantage of the erratic conditions to take home the trophy. Second place went to another DXpeditioner; Marco, IKØYVV, went to African Italy as IG9A. World third place went to Barry, W2UP/3, who was also #1 in the USA. Moving up to first place this year with the #1 score in Europe was Boris, S58A. The battle for second and third place in Europe was a Bavarian Contest Club affair. Ben, DL6FBL, edged out Roland, DK3GI. In the US, second place went to long-time packet champion Charles, K3WW. Taking third position again was Noah, K2NG.

The top scores from each continent were: North America W2UP/3; Africa CT9M; Asia JY9QJ; Japan JH7PKU; Europe S58A; South America YV4GLD; and Oceania KHØ/JF2VAX.

## Multi-Single

Soon after the former USSR collapsed, many Russian contesters had the opportunity to travel to better locations for the CQ WW. They didn't waste much time in establishing P3A as the multi-single to beat. This year was no exception. The P3A team took top world honors. Second place in the world was the multi-national effort from D44TD. The team was made up of a few members of previous years' IG9A multi-multis.

*Professor Jayaraman, VU2JN, a long-time CQ WW participant.*

**e-mail: <k3est@cqww.com>*

Being in D4 sure helps when conditions are up and down. Third place in the world was ZF1A.

To gain first place multi-single in Europe is a real feat! First place went to the Spanish team who manned EA6IB. The team keyed their way to the top of the rankings. Second place went to the fine French team TM5C, and third to the Mt. Capra team of IQ4A.

In the US, Tom's crew at K1KI had the most QSOs and multipliers. They also had the highest score, with 8.1 million points. Second place was taken by W2FU. Third place went to another New England team, K1IR.

The top scores from each continent were: North America ZF1A; Africa D44TD; Asia P3A;

## TROPHY WINNERS AND DONORS

**SINGLE OPERATOR**
**ALL BAND**
**World**
**P4ØW (Opr: Jose Carlos Cardoso Nunes, CT1BOH)**
**Donor:** W9IOP Memorial (Albert Kahn, K4FW)

**World Low Power**
**V26K (Opr: Joseph Trench, AA3B)**
**Donor:** Slovenia Contest Club

**World QRPp**
**Didier Bironneau, FY5FY**
**Donor:** Gene Walsh, N2AA

**World Assisted**
**CT9M (Opr: Frank Grossmann, DL2CC)**
**Donor:** CTRI Contest Group

**USA**
**KT1V (Opr: Dave Patton, NT1N)**
**Donor:** Frankford Radio Club

**USA Low Power**
**Dan Street, K1TO/4**
**Donor:** North Coast Contesters

**USA – Zone 3**
**Ken Keeler, N6RO**
**Donor:** Central Arizona DX Association

**USA – Zone 4**
**Pat Barkey, N9RV**
**Donor:** The Society of Midwest Contesters

**Canada**
**VE2IM (Opr: Yuri Onipko, VE3DZ)**
**Donor:** Jim Fisher, VE1JF

**Carib./C.A.**
**8P5A (Opr: Tom Tom Georgens, W2SC)**
**Donor:** Chuck Shinn, W7MAP

**Europe**
**CT8T (Opr: Timo Klimoff, OH1NOA)**
**Donor:** Edward Bissell, W3AU

**Europe – Low Power**
**LY7Z (Opr: Andrius Ignotas, LY2TA)**
**Donor:** Scott Jones, N3RA & Tim Duffy, K3LR

**Scandanavia**
**OH1F (Opr: Timo Pohjola, OH1MDR)**
**Donor:** W3FYS Memorial (Chas Weir, Jr., W6UM)

**Russia**
**Andrey Bondarenko, RV3FF**
**Donor:** Roman Thomas, RZ3AA

**Africa**
**6V6U (Opr: Richard Neuman, K3IPK)**
**Donor:** Gordon Marshall, W6RR

**Asia**
**Chris Dabrowski, A45XR**
**Donor:** Chuck Shinn, W7MAP

**Japan**
**Satoshi Hara, JH5FXP**
**Donor:** Tack Kumagai, JE1CKA

**Japan – Low Power**
**Masa Okano, JH4UYB**
**Donor:** Western Washington DX Club

**Oceania**
**T88JA (Opr: Toshiyuki Moriyama, JA6VZB)**
**Donor:** CQ Magazine

**South America**
**P40Q (Opr: Scott Redd, KØDQ)**
**Donor:** Venezuela DX Club

**SINGLE OPERATOR, SINGLE BAND**
**World – 28 MHz**
**PX2W (Opr: Hamilton Oliveira Martins, PY2YU)**
**Donor:** Joel Chalmers, KG6DX

**World – 21 MHz**
**HP1XVH (Opr: Stefan Radtke, DL5XX)**
**Donor:** N5JJ Memorial (Don Busick, K5AAD)

**World – 14 MHz**
**JY9NX (Opr: Koji Tahara, JM1CAX)**
**Donor:** W2JT Memorial (North Jersey DX Assn.)

**World - 7 MHz**
**P4ØJ (Opr: Robert Brockman, WX4G)**
**Donor:** Alex M. Kasevich, VP2MM

**World – 3.5 MHz**
**SO2R (Opr: Kaz Drzewiecki, SP2FAX)**
**Donor:** Fred Capossela, K6SSS

**World – 1.8 MHz**
**4X3A (Opr: Riki Kline, 4X4NJ)**
**Donor:** Kenneth Byers, Jr., K4TEA

**USA – 28 MHz**
**Bill Tippett, W4ZV**
**Donor:** Wireless Institute of the Northeast

**USA – 21 MHz**
**James Parise, W1UK**
**Donor:** Wayne Carroll, W4MPY

**USA – 14 MHz**
**Brian Edward, N2MF**
**Donor:** Northern Illinois DX Association

**USA – 7 MHz**
**Philip Allardice, KT3Y**
**Donor:** W6AM Memorial (Jan Perkins, N6AW)

**USA – 3.5 MHz**
**Robye Lahlum, W1MK**
**Donor:** Bill Feidt, NG3K

**USA – 1.8 MHz**
**William Hein, AA6TT/1**
**Donor:** Cathy Obermann Memorial
(Dave Patton, NT1N & Mark Obermann, AG9A)

**Canada (21 MHz)**
**VE6JY (Opr: Gary Caldwell, VA7RR)**
**Donor:** Radio Amateurs of Canada (RAC)

**Carib./C.A. (21 MHz)**
**ZF2NT (Opr: Bruce Sawyer, N6NT)**
**Donor:** CQ Magazine

**Europe – 28 MHz**
**9A5Y (Opr: Sasa Pokorni, 9A3NM)**
**Donor:** Jay Pryor, K4OGG

**Europe – 21 MHz**
**OH6AC (Opr: Jyrki Nieminen, OH6CS)**
**Donor:** Robert Naumann, N5NJ

**Europe – 14 MHz**
**J.P. Fisher, GØIVZ**
**Donor:** G3FXB Memorial (Maud Slater)

**Europe – 7 MHz**
**OHØNL (Opr: Leppala Mauri, OH2BYS)**
**Donor:** Ivo Pezer, 9A3A/5B4ADA

**Europe – 3.5 MHz**
**Robert Bajuk, S57AW**
**Donor:** K3VW Memorial (Frankford Radio Club)

**Europe – 1.8 MHz**
**John Devoldere, ON4UN**
**Donor:** Pat Barkey, N9RV & Terry Zivney, N4TZ

**Japan – 21 MHz**
**Kenji Koishi, JH3AIU**
**Donor:** DX Family Foundation

**Japan – 14 MHz**
**Yoshiharu Katada, JA9CWJ**
**Donor:** CQ Magazine

**MULTI-OPERATOR, SINGLE TRANSMITTER**

**World**
**P3A (Oprs: RA9JX, RW4WR, RW9UP, RZ3AA, RZ9OA, RZ9UA, UA3AB, UA3DPX, UA3TU, UA9CDV, UA9OTM, UA9UR, UA9YAB)**
**Donor:** Anthony Susen, W3AOH

**U.S.A.**
**K1KI (Oprs: K1KI, K1CC, KM1P )**
**Donor:** Douglas Zwiebel, KR2Q

**Canada**
**VE7SV (Oprs: VA7NT, VE7AG, VE7CA, VE7CC, VE7SV)**
**Donor:** Eastern Canadian DX Assn.

**Carib./C.A.**
**ZF1A (Oprs: K6AM, KG5U, K9MK, N4GI, N9XX, W5ASP)**
**Donor:** Lone Star DX Association

**Africa**
**D44TD (Oprs: IK2NCJ, IK2JUB, IK2PFL, SV8CS)**
**Donor:** Harry Booklan, RA3AUU

**Asia**
**RT9W (Oprs: RU9WX, RX9WR, RW9WA, RW9WW, RW3XX, RW9WY, RV9WA, RA9WR)**
**Donor:** Steve Merchant, K6AW

**Europe**
**EA6IB (Oprs: EA3AIR, EA3ALV, EA3AVV, EA3KU, EA5BM, EA5ZF, EA6ACC, EA6FB, EA6FO, EC3AJV)**
**Donor:** Bob Cox, K3EST

**Japan**
**JA7YAA (Oprs: JE7HLZ, JHØNZN, JG7PSJ, JO7FTJ, JI5RPT, JO7DJT)**
**Donor:** Vienna Int'l Amateur Radio Club - 4U1VIC

**Oceania – Pacific Rim**
**9M6A (Oprs)**
**Donor:** Junichi Tanaka, JH4RHF

**South America**
**AY1DZ (Oprs: AY1DZ, LU7EE, LU6EF)**
**Donor:** Araucaria DX Group

**MULTI-OPERATOR, TWO TRANSMITTERS**
**World**
**A61AJ (Oprs: A61AJ, S50R, S53A, S53R, S57CQ, ON4WW, DK7YY, DL3DXX)**
**Donor:** Ranko Boca, YT6A

**USA**
**K4JA (Oprs: K4JA, K4EU, K4MA, K7SV, K9GY, KE9I)**
**Donor:** Northern Neck Contest Club

**MULTI-OPERATOR, MULTI-TRANSMITTER**
**World**
**EA8ZS (Oprs: EA8ZS, OH1MA, OH1RY, OH1JT, OH2BVI, OH2HE, OH2IW, OH2JA, OH2JTE, OH2LUR, OH2XX, OH4JFN, OH5JOC, OH6CT, OH6EI, OH6DD, OH7BX, OH7JR)**
**Donor:** K2GL Memorial (Doug Zwiebel, KR2Q)

**USA**
**KC1XX (Oprs: KC1XX, AD1C, DL7NS, DL7SI, K1GQ, N3RD, N6HB, N6IG, N6MJ, W1FV, W2RQ)**
**Donor:** N6RJ Memorial (Bob Ferrero, W6RJ)

**Europe**
**9A1A (Oprs: N4PN, NF4A, S51R, 9A5W, 9A7R, 9A4WW, 9A5E, 9A6A, 9A2EU, 9A5K, 9A8W, 9A2DQ, 9A9A)**
**Donor:** Finnish Amateur Radio League

**Japan**
**JA5BJC (Oprs: JA5FDJ, JA5JCC, JH5FIS, JH5PHC, JH5RXS, JR5JAQ, JR5VHU, JM1UWB, JA5BJC)**
**Donor:** Ryozo Goto, JH3JYS

**WORLD – SSB/CW COMBINED**
**EA8ZS**
**Donor:** WØID/WØUN ALPHA Award

**JAPAN – MULTI-SINGLE SSB/CW COMBINED**
**JA7YAA**
**Donor:** Vienna Int'l Amateur Radio Club – 4U1VIC

**CONTEST EXPEDITIONS**

**World Single Operator**
**9L1AB (Opr: Andy Chadwick, G3AB)**
**Donor:** Yankee Clipper Contest Club

**World Multi-Single**
**CYØMM (Oprs: N1NK, VE3EY, VE3NZ, VE3NE)**
**Donor:** Carl Cook, AI6V

**World Multi-Multi**
**HC8N (Oprs: K5KA, G3XTT, K1EA, N5KO, S50A, WA6O, K6AW, K1DG, HA1AG, K9NW, S56MM)**
**Donor:** Bill Schneider, K2TT

**SPECIAL – SINGLE OPERATOR AWARD**
**World SSB/CW Combined**
**PTØF, P40E**
**(Opr: Jose Carlos Cardoso Nunes, CT1BOH)**
**Donor:** Hrane Milosevic, YT1AD

**World All Band: Under 21 years old**
**Thomas Andersen, OZ1AA**
**Donor:** Chuck Shinn, W7MAP

**CLUB**

**World SSB/CW**
**Yankee Clipper Contest Club**
**(486,010,298)**
**Donor:** W1WY Memorial (CQ magazine)

**Non-USA SSB/CW**
**Bavarian Contest Club (207,482,977)**
**Donor:** N6AUV Memorial
(Northern California Contest Club)

Japan JA7YAA; Europe EA6IB; South America AY1DZ; and Oceania 9M6A. Special mention must be made of the efforts of CYØMM, T48K, B4R, YI9OM, JV5C (celebrating the 800th anniversary of Genghis Khan), and R1ANF.

## Multi-Two

If you decided to enter the new multi-two category, you found out just how much fun and intense team work can be. Two stations on the air all the time equals a lot of QSOs. Emerging as the first ever world multi-two champion was A61AJ. Ali's group was truly an international crew. Their efforts paid off big time. Second place went to 3V8BB. These guys were everywhere and had good ears. Third world went C53M, the *first* all Latvian contest DXpedition. Congratulations, guys! Also trying out the new category were two European powerhouses who usually enter as multi-multi. Taking first place was the RU1A team. They were closely followed by RW2F. Farther to the west, GI5W took third. After carefully constructing a FB station in Tidewater, Virginia, K4JA's team walked away with the US multi-two top score and a new record. Second place went to N3RS, Sig's fine team in the Philadelphia area. Third place went to another Frankford Radio Club station, N2NU. The top scores from each continent were: North America K4JA; Africa 3V8BB; Asia A61AJ; Europe RU1A; South America LT1F, and Oceania AH2R (Japan no entry).

## Multi-Multi

The battle for the top position in the multi-multi category was *very* fierce. Teams were assembled, plans were made months in advance, and

## TOP SCORES

### WORLD

**Single Operator**
**All Band**

| | |
|---|---|
| P4ØE | 14,251,216 |
| P4ØQ | 11,191,146 |
| P4ØW | 10,076,400 |
| A45XR | 9,300,480 |
| 6V6U | 8,765,820 |
| ZD8A | 8,611,610 |
| 8P5A | 8,521,143 |
| D4B | 8,033,792 |
| KT1V | 8,027,304 |
| 9L1AB | 7,950,840 |

**28 MHz**

| | |
|---|---|
| PX2W | 1,794,338 |
| CX5BW | 1,169,430 |
| 4L8A | 818,976 |
| W4ZV | 625,163 |
| IU9S | 602,301 |
| IR4T | 595,140 |

**21 MHz**

| | |
|---|---|
| HP1XVH | 1,473,683 |
| ZF2NT | 1,290,879 |
| 9M6NA | 1,043,526 |
| PY2NDX | 977,796 |
| VK4EMM | 886,103 |
| VE6JY | 753,640 |

**14 MHz**

| | |
|---|---|
| JY9NX | 1,085,166 |
| PY2NY | 852,720 |
| LU4FM | 850,640 |
| UA9AYA | 751,284 |
| GØIVZ | 653,805 |
| M7Z | 633,290 |

**7 MHz**

| | |
|---|---|
| P4ØJ | 910,315 |
| OHØNL | 864,468 |
| OA4WW | 853,078 |
| YW1D | 757,846 |
| YT7A | 678,456 |
| KT3Y/4 | 569,712 |

**3.5 MHz**

| | |
|---|---|
| SO2R | 403,368 |
| S57AW | 310,310 |
| UN7CW | 303,831 |
| W1MK | 284,050 |
| OH2BH | 271,998 |
| YLØA | 253,920 |

**1.8 MHz**

| | |
|---|---|
| 4X3A | 126,960 |
| FM5GU | 112,651 |
| ON4UN | 107,160 |
| YL2PQ | 74,866 |
| EU6EU | 74,128 |
| RW4PL | 72,261 |

**Low Power**
**All Band**

| | |
|---|---|
| V26K | 8,018,582 |
| CT3EE | 6,964,784 |
| PJ4W | 6,792,895 |
| FM5BH | 6,788,900 |
| FS/KM3T | 5,608,350 |
| S9MX | 5,303,090 |
| K1TO/4 | 4,141,188 |
| LY7Z | 3,976,576 |
| VP9/W6PH | 3,950,969 |
| EA8CN | 3,353,336 |

**28 MHz**

| | |
|---|---|
| CW4A | 1,270,773 |
| LU8DW | 516,648 |
| Z36W | 463,680 |
| LW7DX | 454,450 |
| UN5J | 416,770 |
| 9A3VM | 332,780 |

**21 MHz**

| | |
|---|---|
| VR2BG | 713,022 |
| YV6AZC | 598,995 |
| CT1BQH | 462,308 |
| YZ1AU | 426,184 |
| UAØJQ | 418,990 |
| VO1MP | 414,834 |

**14 MHz**

| | |
|---|---|
| VK4DX | 477,432 |
| S57DX | 363,552 |
| UN9LN | 306,056 |
| 5NØW | 283,745 |
| LZ2TU | 258,292 |
| S57Z | 257,546 |

**7 MHz**

| | |
|---|---|
| TA3D | 661,797 |
| LY6A | 281,586 |
| UT1FA | 247,940 |
| 4Z8EE | 244,174 |
| RK9AWC | 233,700 |
| HA8JV | 226,800 |

**3.5 MHz**

| | |
|---|---|
| HA8EU | 87,370 |
| 4L2M | 75,668 |
| GM3YOR | 60,839 |
| PAØMBD | 26,350 |
| HT9T | 14,310 |
| UA6AKD | 12,996 |

**1.8 MHz**

| | |
|---|---|
| SV1NA | 61,920 |
| YZ7A | 51,900 |
| Z33F | 51,170 |
| LY3UM | 41,554 |
| G4VGO | 40,508 |
| 9A4X | 38,961 |

**QRP, All Band**

| | |
|---|---|
| FY5FY | 3,556,339 |
| P4ØA | 3,408,048 |
| TI5N | 1,581,432 |
| N4KG | 1,139,670 |
| JA6GCE | 1,033,533 |
| YT7TY | 991,716 |
| K1RC | 747,544 |
| UA9AMF | 722,540 |
| VE9DX | 719,355 |
| N8ET | 708,344 |

**Assisted, All Band**

| | |
|---|---|
| CT9M | 11,225,452 |
| IG9A | 10,240,830 |
| W2UP/3 | 7,171,760 |
| S58A | 6,227,543 |
| K3WW | 6,044,506 |
| DL6FBL | 5,338,898 |
| JY9QJ | 5,208,905 |
| RX9SX | 4,276,258 |
| DK3GI | 4,264,875 |
| DF3CB | 4,138,046 |

**Multi-Op, Single Trans.**

| | |
|---|---|
| P3A | 19,470,528 |
| D44TD | 13,092,536 |
| ZF1A | 10,893,000 |
| EA6IB | 10,583,464 |
| TM5C | 9,332,728 |
| RT9W | 8,988,696 |
| IQ4A | 8,596,800 |
| 9A7A | 8,448,192 |

**Multi-Op, Two-Trans.**

| | |
|---|---|
| A61AJ | 24,384,292 |
| 3V8BB | 22,702,797 |
| C53M | 21,161,637 |
| CT9L | 20,941,492 |
| RU1A | 14,817,880 |
| RW2F | 14,122,368 |

**Multi-Op, Multi-Trans.**

| | |
|---|---|
| EA8ZS | 51,429,675 |
| HC8N | 42,449,346 |
| XT2DX | 35,221,070 |
| PT5A | 28,634,736 |
| PJ2T | 21,171,234 |
| J3A | 20,150,950 |

### EUROPE

**Single Operator**
**All Band**

| | |
|---|---|
| CT8T | 7,416,123 |
| SN7Q | 4,949,340 |
| G4BUO | 4,837,520 |
| DL4NAC | 4,778,204 |
| MW5A | 4,633,299 |
| YT6A | 4,604,818 |
| EN7Z | 4,198,624 |
| G3TXF | 4,071,897 |
| OK1RF | 4,013,569 |
| 4U1ITU | 3,550,566 |

**28 MHz**

| | |
|---|---|
| IU9S | 602,301 |
| IR4T | 597,324 |
| TM7XX | 558,448 |
| MD6V | 444,091 |
| S57AL | 420,750 |
| LZ9X | 402,384 |

**21 MHz**

| | |
|---|---|
| OH6AC | 719,780 |
| OHØV | 697,218 |
| S57O | 662,816 |
| SP3GEM | 536,860 |
| YT9X | 534,803 |
| 4U1VIC | 516,768 |

**14 MHz**

| | |
|---|---|
| GØIVZ | 653,805 |
| M7Z | 633,290 |
| OH4A | 623,720 |
| YP3A | 582,030 |
| IT9BLB | 519,871 |
| EW8EW | 483,288 |

**7 MHz**

| | |
|---|---|
| OHØNL | 864,468 |
| YT7A | 678,456 |
| HA9SU | 473,838 |
| IT9/OL5Y | 449,645 |
| OH9DX | 433,784 |
| UZ8M | 342,378 |

**3.5 MHz**

| | |
|---|---|
| SO2R | 403,368 |
| S57AW | 310,310 |
| OH2BH | 271,998 |
| YLØA | 253,920 |
| S5ØU | 244,440 |
| S5ØC | 238,022 |

**1.8 MHz**

| | |
|---|---|
| ON4UN | 107,160 |
| YL2PQ | 74,866 |
| EU6EU | 74,128 |
| RW4PL | 72,261 |
| 9A2AJ | 69,179 |
| HA8IB | 48,807 |

**Low Power**
**All Band**

| | |
|---|---|
| LY7Z | 3,976,576 |
| DL1IAO | 3,097,332 |
| EA7RM | 2,834,382 |
| LY9A | 2,649,402 |
| OK2PP | 2,641,250 |
| DL2OBF | 2,265,088 |
| UA4FER | 2,211,201 |
| DK5PD | 2,100,756 |
| RM3C | 1,978,886 |
| SP4ZO | 1,978,704 |

**28 MHz**

| | |
|---|---|
| Z36W | 463,680 |
| 9A3VM | 332,780 |
| T94FC | 264,040 |
| 4N7N | 259,444 |
| IK7JWY | 256,734 |
| S57J | 256,350 |

**21 MHz**

| | |
|---|---|
| CT1BQH | 462,308 |
| YZ1AU | 426,184 |
| HA8IH | 412,160 |
| UW8M | 346,788 |
| OM2VL | 322,677 |
| EA1AK/7 | 281,850 |

**14 MHz**

| | |
|---|---|
| S57DX | 363,552 |
| LZ2TU | 258,292 |
| S57Z | 257,546 |
| LZ6W | 234,675 |
| YU7BJ | 212,040 |
| YZ1KA | 194,040 |

**7 MHz**

| | |
|---|---|
| LY6A | 281,586 |
| UT1FA | 247,940 |
| HA8JV | 226,800 |
| 4N1FG | 216,945 |
| UW5U | 183,816 |
| 9A7T | 163,357 |

**3.5 MHz**

| | |
|---|---|
| HA8EU | 87,370 |
| GM3YOR | 60,839 |
| PAØMBD | 26,350 |
| UA6AKD | 12,996 |
| PA3BNT | 4,800 |
| OH4ML | 2,530 |

**1.8 MHz**

| | |
|---|---|
| SV1NA | 61,920 |
| YZ7A | 51,900 |
| Z33F | 51,170 |
| LY3UM | 41,554 |
| G4VGO | 40,508 |
| 9A4X | 38,961 |

**QRP, All Band**

| | |
|---|---|
| YT7TY | 991,716 |
| DL3KVR | 678,385 |
| SP6AYP | 599,456 |
| RN6FO | 578,759 |
| HG5Z | 574,180 |
| YU1LM | 534,140 |
| S52P | 530,640 |
| GW3JXN | 523,319 |
| UR5FAI | 437,580 |
| RN4ZT | 396,567 |

**Assisted, All Band**

| | |
|---|---|
| S58A | 6,227,543 |
| DL6FBL | 5,338,898 |
| DK3GI | 4,264,875 |
| DF3CB | 4,138,046 |
| S52ZW | 4,001,408 |
| EA5FV | 3,940,686 |
| UW5Q | 3,281,680 |
| OK2FD | 3,081,045 |
| LY2CY | 2,751,840 |
| OH6NIO | 2,748,466 |

**Multi-Op, Single Trans.**

| | |
|---|---|
| EA6IB | 10,583,464 |
| TM5C | 9,332,728 |
| IQ4A | 8,596,800 |
| 9A7A | 8,448,192 |
| SK3W | 8,226,516 |
| OK5W | 8,040,428 |

**Multi-Op, Two-Trans.**

| | |
|---|---|
| RU1A | 14,817,880 |
| RW2F | 14,122,368 |
| GI5W | 12,185,760 |
| LX5A | 11,072,448 |
| HG6N | 10,580,810 |
| ZA1B | 7,956,520 |

**Multi-Op, Multi-Trans.**

| | |
|---|---|
| 9A1A | 17,255,246 |
| DFØHQ | 16,336,230 |
| GM7V | 10,353,582 |
| LY7A | 9,854,838 |
| OL5T | 6,695,024 |
| OZ5W | 4,862,211 |

### UNITED STATES

**Single Operator**
**All Band**

| | |
|---|---|
| KT1V | 8,027,304 |
| K5ZD/1 | 7,069,788 |
| KQ2M/1 | 6,716,460 |
| N9RV | 6,369,849 |
| W1KM | 6,116,422 |
| N2NT | 5,760,576 |
| W1WEF | 5,268,776 |
| K1AR | 5,003,439 |
| K4ZW | 4,930,744 |
| K3CR | 4,853,225 |

**28 MHz**

| | |
|---|---|
| W4ZV | 625,163 |
| N4BP | 564,921 |
| N9AG/8 | 471,274 |
| K1XX | 366,749 |
| NSØZ | 301,203 |
| WØYK/6 | 219,880 |

**21 MHz**

| | |
|---|---|
| W1UK | 599,610 |
| N5YA | 466,310 |
| W6YA | 440,916 |
| NO4S | 424,501 |
| KVØQ | 418,258 |
| N7DD | 392,450 |

**14 MHz**

| | |
|---|---|
| N2MF | 472,644 |
| K2XR | 425,000 |
| N7WA | 392,496 |
| K7OX | 320,908 |
| K4NNN | 282,438 |
| W5MX | 169,524 |

**7 MHz**

| | |
|---|---|
| KT3Y/4 | 569,712 |
| K4VX/Ø | 341,109 |
| N9TK | 329,784 |
| W3TX | 320,144 |
| N2WW/Ø | 271,776 |
| K4TX | 150,822 |

**3.5 MHz**

| | |
|---|---|
| W1MK | 284,050 |
| NQ4I | 78,100 |
| K4DLJ | 68,324 |
| N5RG | 39,900 |
| K4OAQ | 37,966 |
| W5FO | 16,880 |

**1.8 MHz**

| | |
|---|---|
| AA6TT/1 | 12,390 |
| K4TEA | 4,214 |
| W2VO | 2,613 |
| K6SE | 1,380 |

**Single Operator**
**All Band**
**Low Power**

| | |
|---|---|
| K1TO/4 | 4,141,188 |
| N5AW | 2,346,861 |
| N4TZ/9 | 1,948,608 |
| K4GKD | 1,756,601 |
| N1UR | 1,718,009 |
| W1WAI | 1,711,071 |
| W3EF | 1,685,880 |
| NR3X/4 | 1,630,714 |
| N4IG | 1,611,922 |
| K2YWE/3 | 1,454,400 |

**28 MHz**

| | |
|---|---|
| K5RX | 298,144 |
| WB4TDH | 285,640 |
| K4WI | 246,411 |
| N8II | 224,564 |
| ND4AA | 158,766 |
| WO4O | 145,122 |

**21 MHz**

| | |
|---|---|
| N4MO | 321,672 |
| N6MU | 295,840 |
| W9ILY | 145,288 |
| K8IR | 125,558 |
| W2/UR5DEM | 122,937 |
| NG3Q/8 | 121,410 |

**14 MHz**

| | |
|---|---|
| KA7T | 104,528 |
| W9AU | 99,072 |
| WA1FCN | 69,484 |
| NJ6P | 65,660 |
| KU6T | 23,908 |
| WD6DX | 17,958 |

**7 MHz**

| | |
|---|---|
| WA6IQM/7 | 59,115 |
| NS3T | 45,100 |
| K2AAW/9 | 41,514 |
| KJØB | 31,850 |
| W4IDX | 31,623 |

**3.5 MHz**

No Entry

**1.8 MHz**

| | |
|---|---|
| W5KI/2 | 187 |
| W9IXX/4 | 140 |

**QRP, All Band**

| | |
|---|---|
| N4KG | 1,139,670 |
| K1RC | 747,544 |
| N8ET | 708,344 |
| W9XT | 535,695 |
| W6JTI | 519,750 |
| KA1IS | 501,495 |
| N9CIQ | 500,175 |
| N5TW | 483,538 |
| N4IJ | 419,868 |
| NU4B | 319,462 |

**Assisted, All Band**

| | |
|---|---|
| W2UP/3 | 7,171,760 |
| K3WW | 6,044,506 |
| K2NG | 3,922,595 |
| N2MM | 3,753,664 |
| NO2R | 3,199,317 |
| W2WB | 3,076,652 |
| K3PH | 3,046,180 |
| W3FV | 3,002,167 |
| W1GD/2 | 2,990,400 |
| K2NJ | 2,972,420 |

**Multi-Op, Single Trans.**

| | |
|---|---|
| K1KI | 8,128,326 |
| W2FU | 6,751,892 |
| K1IR | 6,638,640 |
| K8AZ | 6,186,515 |
| K5NZ | 5,086,452 |
| WE2F | 3,226,314 |

**Multi-Op, Two-Trans.**

| | |
|---|---|
| K4JA | 14,084,994 |
| N3RS | 9,291,537 |
| N2NU | 7,968,972 |
| N4WW | 7,020,125 |
| N4RV | 6,426,765 |
| W8AV | 6,177,600 |

**Multi-Op, Multi-Trans.**

| | |
|---|---|
| KC1XX | 19,499,520 |
| W3LPL | 17,219,015 |
| N2RM | 14,162,176 |
| NY4A | 13,013,729 |
| K9NS | 12,647,245 |
| K1TTT | 9,411,944 |



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**FT-1000MP MK V Improving the 1000 series Elite-Class.** Building on the success of the 1000 series, the Mark V offers five new developments. This HF all-mode adds 200W of output power and features Class-A PA operation, interlocked digital bandwidth tracking system, a variable RF front-end filter, and enhanced ergonomics. 16"w x 5.3"h x 13.7"d, 31 lbs..... **$2999.95**

**MK V FIELD Reach the HF Summit!** The Mark V Field brings the technology of the 1000D and Mark V to you in a 100W, self-contained design. This HF all-mode features Class-A (25W) PA operation, interlocked digital bandwidth tracking, a variable RF front-end filter and the ergonomics of the Mark V along with an auto antenna tuner and internal switching-regulator power supply. 16"w x 5.3"h x 13.7"d, 33 lbs..... **$2299.95**

**FT-1000D First in its class.** Covering 160-10M, the 200W 1000D hit the scene with dual receive, 100 memories and a built-in antenna tuner. It quickly became a WINNER in contesting circles and still holds its own with a temperature compensated crystal oscillator, a 500Hz CW crystal filter and 2.4kHz & 2kHz SSB filters. 16"w x 6"h x 15"d, 58 lbs....C/O **$3999.99**

**FT-920 Dedicated to the enhancement of Signal-To-Noise ratio.** The 160-6M 920 is optimized for noise reduction, wide dynamic range and audio tailored to the operator's voice. This 100W rig also features dual watch, extensive menu, keyboard frequency entry, 127 alphanumeric memories and versatile scanning. 15.2"w x 5.3"h x 12.5"d, 24 lbs. NOW! FREE FM board with purchase..... **$1339.95**

## BAND-BY-BAND BREAKDOWN—TOP ALL BAND SCORES

**Number groups indicate: QSOs/Zones/Countries on each band**

### WORLD TOP SINGLE OPERATOR ALL BAND

| Station | 160 | 80 | 40 | 20 | 15 | 10 |
|---|---|---|---|---|---|---|
| P4ØE | 244/14/32 | 727/21/70 | 1463/30/107 | 1261/32/116 | 1646/32/126 | 1685/32/112 |
| P4ØQ | 50/10/22 | 419/17/65 | 1089/25/86 | 1349/34/102 | 1339/30/99 | 2202/28/99 |
| P4ØW | 82/10/21 | 392/17/59 | 1043/26/84 | 1302/34/110 | 1485/30/101 | 1585/28/102 |
| A45XR | 136/11/45 | 197/17/53 | 1230/29/96 | 1015/33/111 | 1349/34/109 | 1165/31/103 |
| 6V6U | 30/10/24 | 211/14/55 | 607/24/73 | 1244/28/92 | 1238/28/99 | 2128/25/95 |
| ZD8A | 54/13/17 | 125/18/49 | 649/27/75 | 873/30/97 | 1757/30/114 | 1553/28/104 |
| 8P5A | 73/9/15 | 597/16/63 | 1311/26/93 | 1144/27/90 | 1306/27/95 | 1819/26/92 |
| D4B | 76/16/48 | 175/17/44 | 1032/25/78 | 897/28/88 | 1041/24/80 | 1925/27/93 |
| KT1V | 95/15/45 | 456/19/77 | 1196/33/102 | 541/33/102 | 1019/30/114 | 803/28/110 |
| 9L1AB | 93/12/40 | 166/18/51 | 438/23/68 | 1437/30/100 | 1451/30/100 | 1308/26/92 |

### USA TOP SINGLE OPERATOR ALL BAND

| Station | 160 | 80 | 40 | 20 | 15 | 10 |
|---|---|---|---|---|---|---|
| KT1V | 95/15/45 | 456/19/77 | 1196/33/102 | 541/33/102 | 1019/30/114 | 803/28/110 |
| K5ZD/1 | 74/15/39 | 283/19/79 | 855/30/110 | 711/36/114 | 824/31/115 | 749/31/107 |
| KQ2M/1 | 42/11/26 | 257/19/81 | 748/31/105 | 560/35/116 | 1027/33/123 | 883/26/107 |
| N9RV | 27/10/17 | 150/22/75 | 886/31/103 | 620/36/118 | 823/34/127 | 794/31/107 |
| W1KM | 53/15/30 | 528/22/82 | 831/27/99 | 621/30/101 | 713/26/93 | 708/26/90 |
| N2NT | 34/9/18 | 350/17/77 | 753/28/101 | 615/34/107 | 869/32/110 | 622/27/97 |
| W1WEF | 28/8/15 | 300/16/67 | 590/30/102 | 605/34/112 | 714/31/107 | 742/23/101 |
| K1AR | 31/11/24 | 235/20/77 | 445/29/104 | 610/34/126 | 499/30/111 | 792/29/112 |
| K4ZW | 27/12/18 | 174/21/73 | 517/31/106 | 372/33/101 | 817/32/117 | 704/29/103 |
| K3CR | 29/10/21 | 239/19/76 | 471/29/103 | 511/34/107 | 695/34/111 | 689/29/112 |

### WORLD MULTI-OPERATOR SINGLE TRANSMITTER

| | | | | | | |
|---|---|---|---|---|---|---|
| P3A | 326/15/71 | 949/21/92 | 1797/31/134 | 1661/39/134 | 1591/35/136 | 2108/35/135 |
| D44TD | 111/14/58 | 304/19/84 | 702/30/105 | 1665/36/137 | 1460/35/134 | 2252/34/138 |
| ZF1A | 226/11/24 | 655/21/84 | 1377/31/119 | 943/33/122 | 1790/32/129 | 1522/29/115 |
| EA6IB | 107/14/72 | 802/29/117 | 1865/33/137 | 1086/33/137 | 1302/33/134 | 1044/35/142 |
| TM5C | 60/8/59 | 742/23/98 | 1551/32/127 | 1017/31/129 | 1026/34/136 | 1068/34/131 |
| RT9W | 270/12/59 | 686/21/84 | 951/30/118 | 851/34/114 | 788/33/124 | 914/32/125 |

### USA MULTI-OPERATOR SINGLE TRANSMITTER

| | | | | | | |
|---|---|---|---|---|---|---|
| K1KI | 41/14/39 | 311/23/97 | 1086/36/132 | 554/38/136 | 902/35/138 | 652/31/130 |
| W2FU | 36/13/34 | 241/25/98 | 820/33/120 | 515/38/137 | 957/36/139 | 692/30/120 |
| K1IR | 32/10/31 | 445/22/96 | 762/33/121 | 582/36/135 | 754/31/130 | 766/28/123 |
| K8AZ | 34/14/31 | 158/24/93 | 737/32/125 | 573/39/140 | 796/35/138 | 568/33/131 |
| K5NZ | 19/9/18 | 87/24/75 | 601/35/127 | 487/37/135 | 582/34/137 | 693/32/135 |
| WE2F | 18/8/9 | 116/17/64 | 222/26/99 | 340/34/103 | 782/32/114 | 466/26/90 |

### WORLD MULTI-OPERATOR TWO TRANSMITTER

| | | | | | | |
|---|---|---|---|---|---|---|
| A61AJ | 405/14/56 | 963/30/102 | 2546/36/129 | 1679/38/140 | 2421/38/139 | 2491/38/138 |
| 3V8BB | 532/11/64 | 1102/19/83 | 2810/35/120 | 1609/38/118 | 2238/35/123 | 2258/33/114 |
| C53M | 163/14/54 | 634/20/78 | 2003/30/107 | 1966/37/122 | 2873/35/125 | 3135/31/118 |
| CT9L | 123/9/38 | 1144/18/87 | 1824/30/110 | 1408/38/138 | 2550/35/141 | 2143/32/130 |
| RU1A | 312/17/74 | 1142/32/120 | 1991/36/141 | 1717/38/138 | 1565/36/146 | 1084/35/139 |
| RW2F | 693/18/79 | 1318/30/118 | 1827/36/133 | 1510/34/131 | 1749/36/145 | 1035/35/141 |

### USA MULTI-OPERATOR TWO TRANSMITTER

| | | | | | | |
|---|---|---|---|---|---|---|
| K4JA | 79/18/56 | 625/21/105 | 1480/36/133 | 911/38/146 | 1568/35/144 | 1085/34/137 |
| N3RS | 43/12/30 | 279/23/95 | 1228/36/127 | 607/37/140 | 1129/35/143 | 1091/31/128 |
| N2NU | 46/13/28 | 367/22/93 | 751/30/116 | 819/37/136 | 1127/34/138 | 804/31/125 |
| N4WW | 34/11/21 | 218/24/93 | 735/31/120 | 598/37/129 | 988/34/142 | 1003/31/118 |
| N4RV | 31/11/21 | 205/20/82 | 485/31/117 | 563/36/125 | 1237/33/141 | 653/30/118 |
| W8AV | 49/14/32 | 221/20/84 | 449/32/123 | 549/37/134 | 1096/34/138 | 665/31/121 |

### WORLD MULTI-OPERATOR MULTI-TRANSMITTER

| | | | | | | |
|---|---|---|---|---|---|---|
| EA8ZS | 992/20/101 | 2160/32/126 | 3395/37/146 | 3823/38/152 | 3418/38/163 | 3387/37/155 |
| HC8N | 595/18/41 | 1472/29/108 | 3069/37/141 | 3367/38/149 | 3813/37/158 | 4045/35/151 |
| XT2DX | 179/15/53 | 582/21/74 | 2424/35/126 | 4148/38/142 | 3957/37/150 | 3549/34/140 |
| PT5A | 301/19/63 | 437/22/79 | 1807/35/117 | 2736/37/133 | 3404/37/151 | 3683/36/143 |
| PJ2T | 481/15/31 | 730/19/70 | 1645/29/116 | 3180/39/144 | 2591/31/113 | 2058/31/111 |
| J3A | 148/10/23 | 738/22/82 | 2121/32/117 | 2910/36/131 | 2993/33/138 | 2853/33/128 |

### USA MULTI-OPERATOR MULTI-TRANSMITTER

| | | | | | | |
|---|---|---|---|---|---|---|
| KC1XX | 191/17/65 | 825/29/121 | 1724/37/136 | 1560/39/152 | 1835/38/150 | 1543/34/142 |
| W3LPL | 269/17/59 | 796/29/112 | 1624/36/135 | 1371/38/144 | 1747/36/148 | 1457/33/142 |
| N2RM | 103/16/50 | 416/23/103 | 1269/37/138 | 1509/38/146 | 1555/35/142 | 1283/32/136 |
| NY4A | 33/12/23 | 372/24/101 | 1437/34/126 | 1417/38/144 | 1530/35/141 | 1259/32/129 |
| K9NS | 166/21/46 | 314/28/96 | 1102/37/135 | 1311/38/146 | 1531/37/147 | 1127/34/130 |
| K1TTT | 92/11/34 | 863/24/94 | 1686/32/126 | 1145/37/139 | 1281/35/138 | 1002/30/121 |

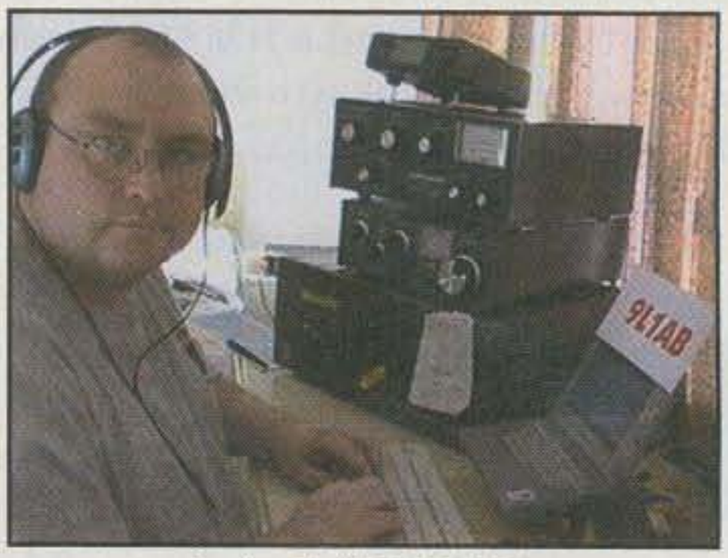
big stations were built or enhanced. The crews all knew one another and that made it even more fun. This year's winner was the team from EA8ZS, operating from a banana plantation. On the slopes of a dead volcano on San Cristobal island, HC8N keyed their way to second place. Third place went to the Voodoo Contest Club. They used all their magic to put XT2DX in almost everyone's log.

The number one score in Europe went to 9A1A. Their newly rebuilt station on a mountain ridge in northern Croatia makes them very competitive. Second place went to DFØHQ located in southeastern Germany. The number three European station was GM7V, the North of Scotland Contest group.

Here in the US there is always a battle for the top spot. All three top finishers are familiar calls. Taking first place again was Matt's team at KC1XX located in south central New Hampshire. Second place went to Frank's team at W3LPL, and third went to Bob's team, N2RM, operating from eastern New Jersey. The top scores from each continent were: North America J3A; Africa EA8ZS; Asia JA5BJC; Europe 9A1A; and South America HC8N (Oceania no entrant).

## Clubs

One of the best ways to enjoy ham radio is to join a club. There are many contest clubs, and one is probably near you. If you don't already belong to a club, join one and help them out in the CQ WW club competition. The US clubs always have a strong participation in the CQ WW, and this year was no exception. The battle for first place in the US and DX was fierce! After all the log checking, it was determined that the Yankee Clipper Contest Club had just edged out the Frankford Radio Club. Third place went to the Potomac Valley Radio Club. In the rest of the world, top honors were taken by the Bavarian Contest Club, who just edged out the Rhein-Ruhr DX Association. Third place went to Contest Club Finland. The competition for a top club spot is heating up.




*Andy, 9L1AB (G3AB).*

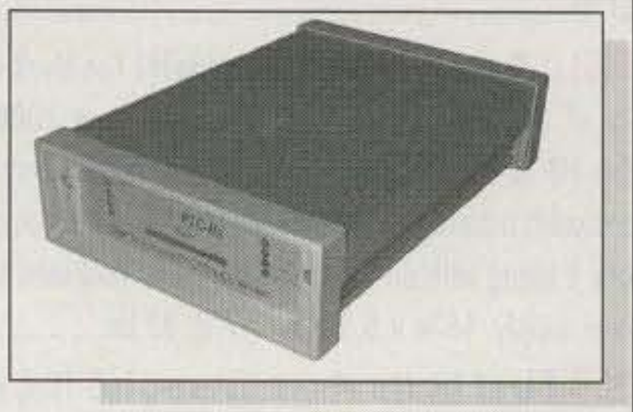
## Team Contesting

Get on the air, make some friends, get them to join a five man team, and what do you have? Team contesting. Teams can be local or from anywhere in the world. This year there were 21 teams! Here's how they finished:


**PACTOR 2 MODEM**

**PTC-2ex Modem Multimode**

- PACTOR-II & PACTOR-III
- Compact unit
- Low power consumption
- GPS interface for NMEA data



**PTC-2 PRO Modem Multimode**

- PACTOR-II & PACTOR-III
- Real multi port unit
- Low power consumption
- GPS interface for NMEA data

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## EUROPE TOP SINGLE OPERATOR ALL BAND

| Station | 160 | 80 | 40 | 20 | 15 | 10 |
|---|---|---|---|---|---|---|
| CT8T | 160/12/55 | 826/18/78 | 989/22/89 | 1082/27/98 | 960/30/96 | 1760/28/96 |
| SN7Q | 343/15/60 | 788/22/82 | 784/30/99 | 623/24/72 | 750/30/96 | 723/28/102 |
| G4BUO | 166/11/58 | 615/17/73 | 591/24/92 | 709/32/103 | 632/30/103 | 608/32/105 |
| DL4NAC | 65/7/51 | 195/17/68 | 1174/31/111 | 744/28/89 | 575/28/97 | 550/35/106 |
| MW5A | 38/7/38 | 394/15/65 | 1105/23/87 | 988/25/84 | 657/26/76 | 889/27/88 |
| YT6A | 125/9/52 | 306/16/76 | 1033/34/119 | 845/34/115 | 1018/32/119 | 375/29/92 |
| G3TXF | 200/10/56 | 719/19/76 | 381/22/84 | 426/24/81 | 672/28/93 | 824/26/102 |
| OK1RF | 119/11/52 | 286/18/71 | 809/32/110 | 879/32/104 | 291/27/83 | 521/32/107 |
| 4U1ITU | 203/6/42 | 650/11/53 | 1452/24/90 | 1167/23/75 | 1372/27/82 | 1805/22/79 |
| OH1F | 197/8/43 | 378/15/64 | 1511/30/90 | 2103/28/85 | 1116/29/89 | 556/27/87 |

## EUROPE MULTI-OPERATOR SINGLE TRANSMITTER

| | | | | | | |
|---|---|---|---|---|---|---|
| EA6IB | 107/14/72 | 802/29/117 | 1865/33/137 | 1086/33/137 | 1302/33/134 | 1044/35/142 |
| TM5C | 60/8/59 | 742/23/98 | 1551/32/127 | 1017/31/129 | 1026/34/136 | 1068/34/131 |
| IQ4A | 66/12/66 | 480/25/104 | 1100/34/135 | 874/36/140 | 1089/36/139 | 1019/36/137 |
| 9A7A | 161/11/68 | 696/22/93 | 1329/36/137 | 660/33/119 | 1294/36/144 | 915/33/132 |
| SK3W | 63/11/62 | 470/26/107 | 1125/38/137 | 915/36/129 | 1164/32/132 | 696/35/131 |
| OK5W | 149/12/68 | 762/27/103 | 1174/36/136 | 641/35/136 | 913/35/142 | 868/35/137 |

## EUROPE MULTI-OPERATOR TWO TRANSMITTER

| | | | | | | |
|---|---|---|---|---|---|---|
| RU1A | 312/17/74 | 1142/32/120 | 1991/36/141 | 1717/38/138 | 1565/36/146 | 1084/35/139 |
| RW2F | 693/18/79 | 1318/30/118 | 1827/36/133 | 1510/34/131 | 1749/36/145 | 1035/35/141 |
| GI5W | 337/10/64 | 1581/21/101 | 1899/37/133 | 1493/33/122 | 1815/33/136 | 1256/31/127 |
| LX5A | 478/9/60 | 1565/20/93 | 1389/33/118 | 1184/33/126 | 1773/33/134 | 1396/32/127 |
| HG6N | 497/14/71 | 1302/27/106 | 1187/35/129 | 1042/32/118 | 1621/36/142 | 1237/34/137 |
| ZA1B | 480/12/64 | 1583/21/89 | 1571/27/90 | 1101/27/89 | 1734/31/102 | 1515/24/100 |

## EUROPE MULTI-OPERATOR MULTI-TRANSMITTER

| | | | | | | |
|---|---|---|---|---|---|---|
| 9A1A | 843/17/79 | 1428/30/105 | 2478/36/142 | 2149/36/139 | 2277/37/137 | 1700/37/134 |
| DFØHQ | 683/13/74 | 1560/28/104 | 2165/38/143 | 1824/37/143 | 1818/37/153 | 1448/36/149 |
| GM7V | 809/13/70 | 1297/21/94 | 1502/30/107 | 1934/34/125 | 1401/35/135 | 1237/29/116 |
| LY7A | 703/14/72 | 1222/22/87 | 1687/36/129 | 1392/32/121 | 1291/35/135 | 937/33/121 |
| OL5T | 260/7/55 | 695/16/74 | 643/26/105 | 1521/36/135 | 1210/34/135 | 676/35/133 |
| OZ5W | 32/5/27 | 675/18/87 | 635/28/120 | 1002/34/118 | 639/31/127 | 422/31/131 |

**1. Rhein-Ruhr Steamboats:** CT9M (DL2CC), DJ2YA, DL2OBF, DL3YBM, PJ4W (DL1EFD)—25,052,255

**2. Royal Bavarian Contest Team #1:** DF3CB, DK3GI, DL4NAC, DL6FBL, JY9QJ—23,728,928

**3. Team Contest Club Ontario:** VE2IM (VE3DZ), VE3ANX, VE3AT, VE3EJ, VE3XB—19,361,379

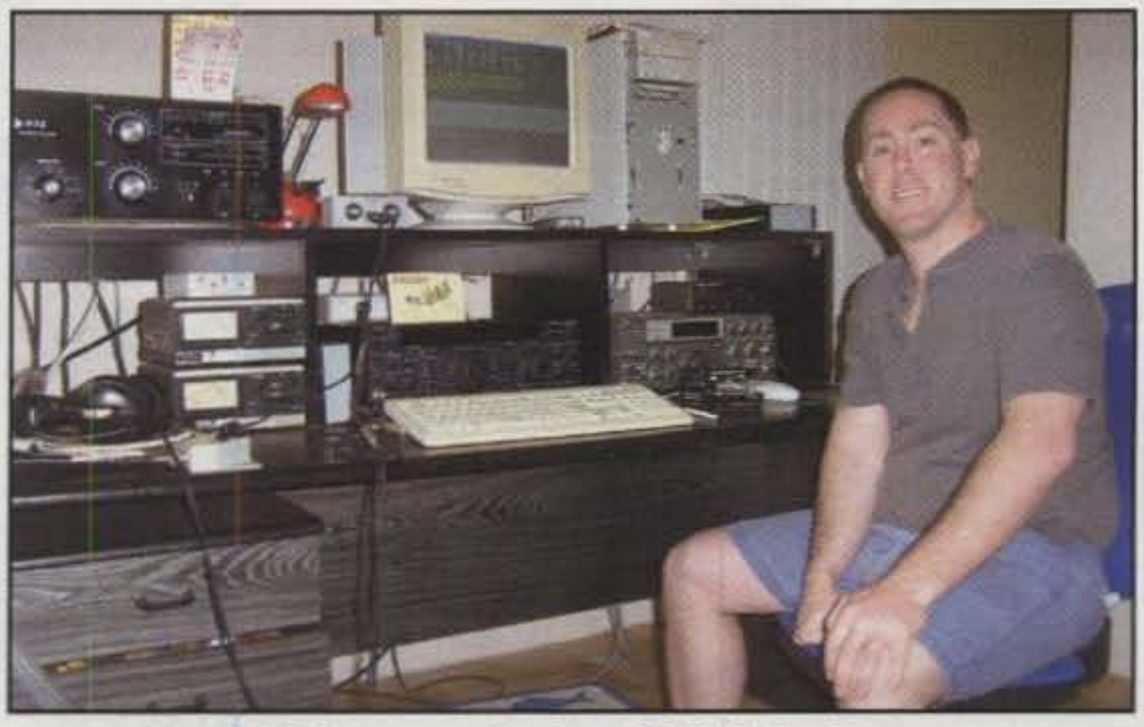
**4. Twist-off Lids:** KT1V (NT1N), W6EEN (N6RT), ZD8A (K6NA), N6TW, 9V1YC—19,157,892

**5. Snap-on Lids:** K5ZD/1, N2NT, 4G1A (N2NL), RW9OWD (N6ZZ), NØAX/7—19,002,723

**6. CCF Sunburn:** CT8T (OH1NOA), LY2CY, LY7Z (LY2TA), OHØZ (OH2MA), OH1F (OH1MDR)—18,465,194

**7. Reusable Lids:** K1TO, N2IC, K5GN, K1AR—17,469,413

*ZP6T, "the team."*



*Paul, K9PG, was on the air as FM5BH for the contest.*

**8. Disposable Lids:** FS/KM3T, N5RZ, K2UA, K5TR—15,854,736

**9. Royal Bavarian Contest Team #2:** DF4RD, DL1IAO, DKØDO (DL1MGB), OE8CIQ, CU/DJ9RR—10,902,350

**10. WWYC All Night Runners:** 8S2F (SM3WMV), IK3UNA, OZ1AA, ON4CCP—5,950,274

**11. CCF Frozen Paddles:** OA4WW (OHØXX), OH2BH (OH1WZ), OH4A (OH6QU), OH5CW, OH8LAE—4,392,440

**12. WWYC Kinky Callers:** 9A2RD (9A6NDX), DJ9AO, NR3X (N4YDU)—3,847,958

**13. N1MM Logger Users A:** VE1OP, W1EBI, K1NT—3,210,123

**14. CCF Help:** OH1MM, OH5DX, OH6NIO—3,148,086

**15. Royal Bavarian Contest Team #3:** DL5RMH, DFØWA (DL2MEH), HBØ/DJØIP, OE2S (OE2VEL)—2,597,691

**16. CCF Sweet FIFTEEN:** 9M6NA (JE1JKL), OHØV (OH6LI), OH6AC (OH6CS)—2,460,524

**17. N1MM Logger Users B:** WW3S, N7OR, KB4N, MMØBQI, M2D (G4BYG)—1,978,936

**18. CCF Frost Bitten:** OH2LU, OH1HD, OH6BG, OH6NJ—1,272,753

**19. WWYC Pile-up Penetrators:** DJ1YFK, S57O (S51TA), K9YO—1,148,184

**20. TA2BK is on the air – Team 2:** TA3D, TA3J, TA2DA—918,145

**21. Royal Bavarian Contest Team #4:** DL9NEI, DL8NFU, DK2GZ, DH1TW—887,624

**22. TA2BK is on the air – Team 1:** TA1DX, TA3YJ, TA1EQ—3,723.

## Special Mention

The contest is made more interesting by the many DXpeditions that fan out around the world. Here are some of the exotic calls you may have worked: V26K, 8P5A, VP9/W6PH, VP9/WA3AAN, ZF2NT, TG4/WØIZ, 6Y8A, FM5BH, V47KP, VP5V, KP2/OK1TN, KP2/OK1CW, ZD8A, EA8/ES6DO, EA8/OH2NC, D4B, CT3EE, 3B8CF, CN2R, 5NØHHD, S9MX, 6V6U, 9L1AB, SØ7PM, 9S1X, RW9OWD, A92ZE, RA9CO, AD6TF, 4Z8EE, JY9NX, RN9AO, XW1IC, HZ1AB, BV4YI, SU9US, ZC4VG, 3W2LWS, 4U1ITU, 4U1VIC, OHØV, OHØNL, CU/DJ9RR, EA6/DL8NBY, SV9/LA4XFA, J45KLN, MU5X, GJ2A, MJØASP, CT8T, IU9S, IT9/OL5Y, MM/SP2AVE, T88JA, V8YYY, 9M6NA, 9M6JU, KH6/K1ER, KH6/VA7CW, 8N1OGA, 4G1A, P40E, P40Q, P40W, P40J, PJ4W, P40A, TI5N, 6Y1A, 6Y9A, KE7X, KH6/W8QZA, 6Y4A, 6YØA, IG9A, CT9M, TA2/Z31GX, KHØ/JF2VAX, C6AJX, ZF1A, T48K, HQ3J, CYØMM, EA8/DL6QW, D44TD, P3A, YI9OM, JV5C, EA6IB, LX7I, 9M6A, R1ANF, C6AKP, J75A, WP2Z, C53M, CT9L, 3V8BB, 9K9X, A61AJ, ZA1B, EA6/DL1GGT, LX5A, AH2R, J3A, XT2DX, EA8ZS, PT5A, HC8N, and PJ2T.

Outstanding single-band efforts were everywhere. To name a few: 9M6NA, 4L8A, VK4EMM, JY9NX, OA4WW, UN7CW, 4X3A, UN5J, VR2BG, UAØJQ, VK4DX, UN9LN, TA3D, 4Z8EE, RK9AWC, 4L2M, NSØZ, WØYK/6, W6YA, N7WA, K7OX, K4VX/0, N6MU, KA7T, NJ6P, and WA6IQM/7.

## Comments

The CQ WW Contest Committee wants to thank all the contesters who submitted an electronic log in 2002. We had a total of approximately 7800 logs between SSB and CW, 7700 of which were electronic submissions! That's a lot of guys and gals making the effort to do it right. All the major contesting software packages will produce a Cabrillo log out-

*(Continued on page 100)*

*As our way of life has become less secure, some radio amateurs have been looking for economical equipment that will continue to operate under harsh emergency conditions. SGC has taken one such radio, the SG-2020, and made it even better and more flexible by adding "Adaptive Digital Signal Processing," or ADSP, on a board that can also be used in other radios.*

## *CQ Reviews:*

# The Noise-Reduced SG-2020 ADSP2 HF Transceiver and Separate ADSP2 Board

**BY BRUCE PRIOR,[1] N7RR**

A review of the SGC SG-2020 HF transceiver, by Dave Ingram, K4TWJ, was published in the June 1999 issue of *CQ*. The basic SG-2020 is a rugged, compact 20 watt transceiver that is especially designed for mobile and portable operation. We could rely on the SG-2020 in a prolonged emergency. Covering all amateur bands from 160 through 10 meters, the rig includes 20 programmable and tunable memory channels, an RF gain control, a noise blanker to fight pulsed ignition noise in a motor vehicle, passband tuning, RIT, XIT, SPLIT operation, speed-adjustable fast tuning, a comfortable tuning knob with a rubber cover, an analog SCAF bandwidth filter ranging from 100 Hz to 2.7 kHz, and a mode B internal iambic keyer with a very wide speed range (from 5 to 60 wpm). Now there's an enhancement of this basic model, the SG-2020 ADSP$^2$ (see photo A)!

The staff members at SGC call themselves "the SSB people." Although the SG-2020 ADSP$^2$ is capable of CW as well as LSB and USB operation, the transceiver is most suitable for the many radio amateurs who concentrate their operating on single sideband and digital operation, using CW only occasionally. Transmit-Receive switching is performed with a mechanical relay system, which is no impediment to SSB, but the T-R change-over introduces staccato clicking to the operating environment during CW transmission. Because its T-R switching time is less than 10 ms, this transceiver will also operate with the use of an external modem in the numerous digital modes that computer sound cards have made possible.

Since Dave's review appeared, SGC has added a significant digital enhancement to the AF stage of the SG-2020. The additional internal ADSP$^2$ module includes what SGC calls "Adaptive Digital Signal Processing," or ADSP™, combined with "Spectral Noise Subtraction," or SNS™. The SG-2020 with the new ADSP$^2$ module installed offers the user an entirely new listening experience. The SG-2020 ADSP$^2$ is one of the finest noise-fighting transceivers in its price class.

*Photo A– The SG-2020 ADSP$^2$ works the same as the basic SG-2020 except that the internal ADSP$^2$ board adds interfering carrier attenuation, atmospheric noise-fighting capability, and bandwidth filter.*

Whether operating SSB, CW, or digital, by holding the **CMD** button while depressing the **SPLIT** button, ADSP™ Level 1 significantly reduces the ambient noise surrounding the signal. ADSP™ Level 1 works best when copying relatively weak signals in the presence of moderate atmospheric noise. The improvement is especially marked when the incoming signal is just barely above the normal noise level. Repeat the same **CMD-SPLIT** button sequence and ADSP™ Level 2 is implemented, radically reducing noise levels. ADSP™ Level 2

[1] *853 Alder Street, Blaine, WA 98230-8030 e-mail: <n7rr@hotmail.com>*

[2] *SGC, Inc., 13737 S.E. 26th St., Bellevue, WA 98005; <http://www.sgcworld.com> e-mail: <sgc@sgcworld.com>; phone 1-800-259-7331*

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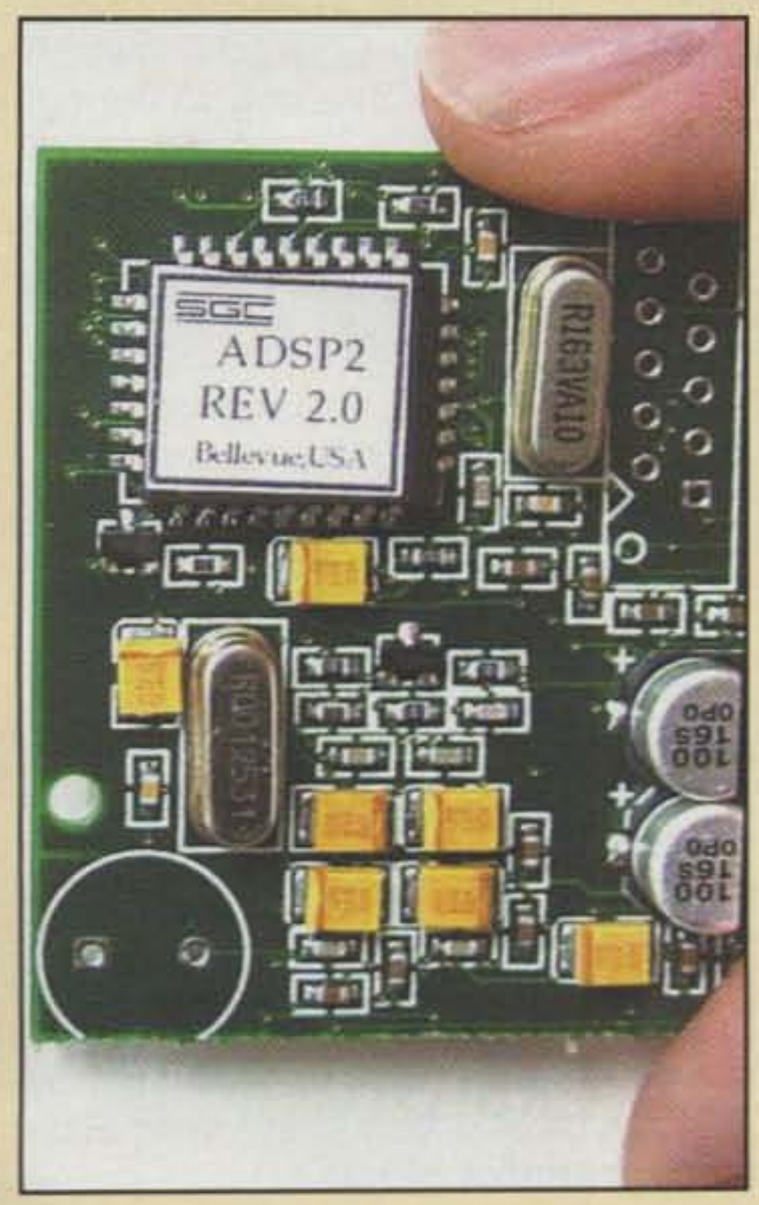


*Photo B– The Low Audio ADSP² board is designed for internal installation in the SG-2020 or many other receivers or transceivers.*

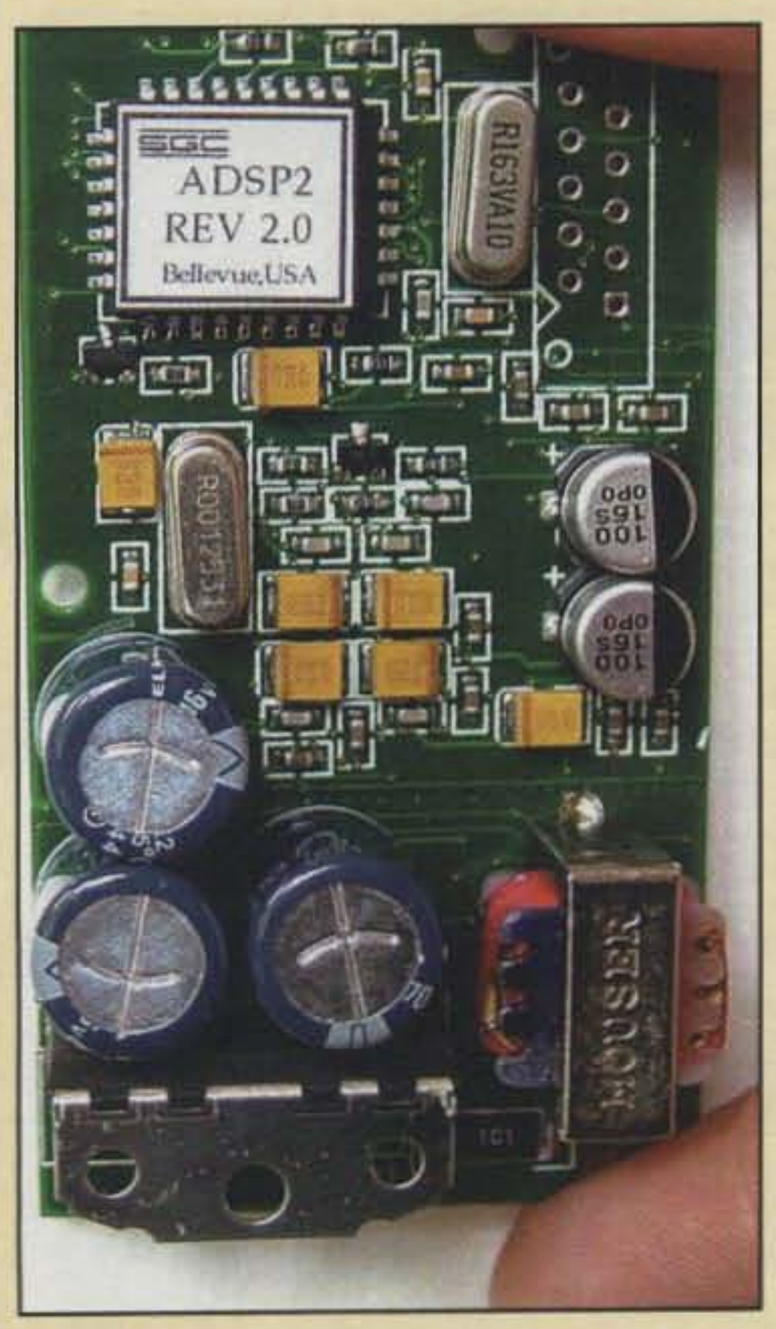


*Photo C– The High Audio ADSP² board can be installed either internally or externally following the audio amplifier.*

introduces enough signal processing that some of the signal properties are also changed. ADSP™ Level 2 is therefore a better choice for copying moderate to strong signals during high-noise conditions. The ADSP™ noise reduction impacts both atmospheric noise and receiver noise. Up to five interfering heterodynes can also be nulled simultaneously.

In spite of the very fast signal-processing action shown in the specifications box, the automatic tone rejection filter includes enough of a delay that it does not interfere with any CW reception above extremely low-speed. Even 5 wpm CW comes through just fine. Current SG-2020 owners can improve their transceiver significantly by investing in the ADSP² module.

The ADSP² card in the SG-2020 has a second function as well. Hold **CMD** and depress **BW** to introduce digital bandwidth filtering, in addition to the analog filtering which is already present in the SG-2020 SCAF circuit. ADSP² bandwidth filtering has three stages: 1800 Hz, 500 Hz, and 100 Hz.

## ADSP² for any Receiver or Transceiver

Now here's the really good news: You don't have to own an SG-2020 transceiver to take advantage of the new ADSP² technology. SGC sells two versions of the ADSP² board, the Low Audio ADSP² board (photo B) and the High Audio ADSP² board (photo C). The Low Audio ADSP² board can be factory installed in any SG-2020 transceiver. This version can also be mounted inside many *other* receivers and transceivers.

In my review of the Ten-Tec Argonaut V in the March 2003 issue of *CQ*, I wrote, "The nine-step noise blanker achieves some atmospheric noise reduction, but it is not the best implementation of this feature on the amateur radio market in the price class of the Argonaut." I had already tried out the first-generation of the ADSP™ board in the SG-2020 when I wrote that. The original ADSP™ board had one function: the equivalent of level 1 noise and carrier attenuation on the ADSP² board. It included neither ADSP™ level 2 noise and carrier attenuation nor bandpass filtering.

Our Argonaut V now sports an internal ADSP² board, which means that two of the six items on my Argonaut V "quibbles" list have evaporated. We now have a fine automatic notch filter against inter-

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**SGC ADSP² Technical Specifications**

| Specification | Low Audio Version | High Audio Version |
|---|---|---|
| Size | 1.7" × 1.475" (4.32 cm × 3.75 cm) | 2.645" × 1.475" (6.72 cm × 3.75 cm) |
| Weight | 0.6 oz (17.0 g) | 1.1 oz (31.2 g) |
| Input voltage | 12 $V_{DC}$ | 12 $V_{DC}$ |
| Audio Limits | | |
| Minimum Input | 10 $mV_{RMS}$ | 100 $mV_{RMS}$ |
| Maximum Input | 150 $mV_{RMS}$ | 5 $V_{RMS}$ |
| Maximum Output | 0.5 $V_{RMS}$ | 9 $V_{RMS}$ |
| Power Output | (inside AF circuit) | 5 $W_{RMS}$ |
| Current Consumption | | |
| idle | 80 mA | 110 mA |
| full out | 80 mA | 500 mA |
| Out of Band Rejection | –45 dB | –45 dB |
| **Both Versions:** | **ADSP Level 1** | **ADSP Level 2** |
| Noise Reduction | 13 dB | 26 dB |
| Time Delay | 6.5 ms | 13 ms |
| Tone Rejection | –50 dB | –65 dB |
| **Filters @ 3 dB Bandwidth** | | |
| Voice Narrow | 300–2100 Hz | |
| CW Wide | 400–900 Hz | |
| CW Narrow | 600–700 Hz | |

fering carriers as well as very effective atmospheric noise attenuation and extra bandpass filtering. With the ADSP² board installed, the receiver in the Argonaut V has finally surpassed the well-respected Ten-Tec Omni VI+. (The Omni VI+ has no filtering, which is effective against atmospheric noise, and its automatic notch filter reacts too quickly to be useful for CW operation.)

The only disadvantage of ADSP² installation in a non-SGC rig is that there are no visual indicators when any of the ADSP² functions are operational, and it must be controlled by a pair of tiny SGC-supplied momentary switches which can be attached adhesively to the rig. The Low Audio ADSP² board is wired in series with the receiver audio stage, just ahead of the audio amplifier. It can be mounted inside the battery compartment of a Yaesu FT-817.

## High Audio Board

The High Audio ADSP² board is designed to be mounted externally. It connects between the audio output of the receiver or transceiver and the speaker or headphones. Either version of the ADSP² board costs $180. Since the ADSP² board is fully integrated with the command system in the SG-2020, it must be installed at the SGC factory. Before the end of June of this year, SG-2020 owners may upgrade to ADSP² for $120, including factory installation. When the installation is performed by SGC on other radios, there is an additional charge of $49.95.[2]

My company, Kairos Research[3], sells a comprehensive, laminated two-card Quick Guide for the SG-2020 ADSP² for $8.00 by check or money order, including shipping. ■


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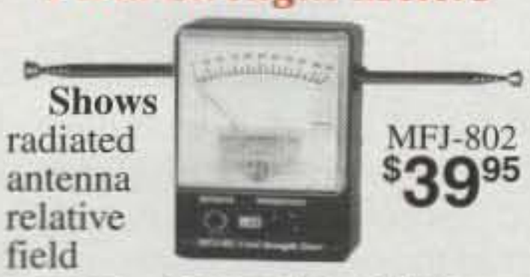

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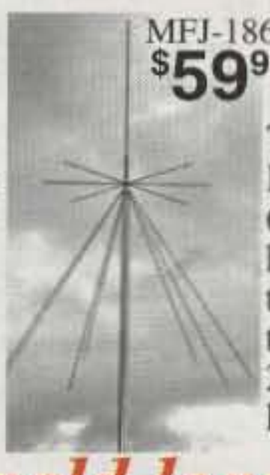

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BY BOB JOSUWEIT,* WA3PZO

# Hams: First of the First Responders

Amateur radio is a national resource. That's the message coming from the U.S. Department of Homeland Security and the halls of Congress. Liz DiGregorio, DHS liaison to the White House for Citizen Corps, told amateur radio operators that hams are "the first of the first responders." She was speaking at the signing of a Statement of Affiliation between DHS and the American Radio Relay League in June at the ARRL National Convention in Dallas.

*Ron Castleman, Chief Operating Officer of the Emergency Preparedness and Response Directorate of the U.S. Department of Homeland Security, looks on as ARRL President Jim Haynie, W5JBP, signs a Statement of Affiliation between the ARRL and DHS. (Photo by Jeff Reinhardt, AA6JR)*

## ARRL/DHS Sign Affiliation Agreement

"You are there. You are part of that very, very first response when it happens locally," said DiGregorio, referring specifically to the initial stages of an emergency or disaster. She urged amateurs to explore ways to expand their role in the community beyond being the last resort when other communication systems fail. "You need to show your community that you're engaged," she said. "They need to know as a community that the ARRL is there."

Ron Castleman, Chief Operating Officer of DHS's Emergency Preparedness and Response Directorate (formerly FEMA), said his agency really needs amateur radio's help. "Hams have a long and distinguished history of assisting and cooperating with FEMA," he said. That cooperation dates back to a 1984 Memorandum of Understanding between the League and the Federal Emergency Management Agency. He said the agency, now part of the Department of Homeland Security, wants to continue to work with amateur radio operators as partners and expand hams' community safety role. "We also want to help prepare every citizen across our country before disaster strikes," Castleman added.

The ARRL is now an affiliate of the four charter Citizen Corps programs—Neighborhood Watch, Volunteers in Police Service, Community Emergency Response Teams, and Medical Reserve Corps. The League joins the National Safety Council, Points of Light Foundation, National Voluntary Organizations Active in Disaster, National Volunteer Fire Council, National Fire Protection Association, Save A Life Foundation, and The Jaycees as Citizen Corps affiliate programs.

The Statement of Affiliation calls on DHS and ARRL to raise public awareness of amateur radio as a safety resource. "That's what you are all about, and we need a safer America," DiGregorio said in outlining the ARRL's role within the program.

In addition, DHS and the ARRL will cooperate in providing training and accreditation for amateur radio emergency communications. They also will work together to promote the formation of local Citizen Corps councils and assist them with education, training, and volunteer service opportunities "that support first responders, disaster relief organizations, and community safety efforts." As an affiliate, the ARRL website will be linked from the FEMA and Citizen Corps sites.

"We need you, and you need us, and we want to work together with you to make this all happen," DiGregorio concluded, "because we all share the same goal, and that goal is a better, stronger, more secure America."

The Department of Homeland Security and the American Radio Relay League view community disaster preparedness and response as top priorities for their respective organizations and for the American people. As such, both organizations have come together to provide mutual support for Citizen Corps.

Citizen Corps is a community-based initiative to engage all citizens in homeland security and community and family preparedness through public education and outreach, training opportunities, and volunteer programs. It operates under the direction of DHS. Programs under the Citizen Corps umbrella include activities that help communities prevent, prepare for, and respond to terrorism, public health issues, and disasters of all kinds. It encourages all Americans to take an active role in building safer, stronger, and better-prepared communities.

"The affiliation between Citizen Corps and the American Radio Relay League will help raise public awareness about public safety through the use

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of amateur radio," said Michael D. Brown, Under Secretary of Homeland Security for Emergency Preparedness and Response, also speaking at the signing ceremony. "I look forward to working with the American Radio Relay League to expand the role citizens play within their community to be more secure and better able to respond to disasters of all kinds."

## Amateur Radio Goes to Capitol Hill

Last June Congress evaluated the spectrum needs of our nation's first responders, and amateur radio was represented at the hearing held by the House Subcommittee on Telecommunications and the Internet. ARRL President Jim Haynie, W5JBP, testified on the importance of amateur radio in emergencies as well as on behalf of HR 713, the Amateur Radio Spectrum Protection Act.[1]

Several other speakers at the hearing mentioned the importance of amateur radio. Edmond Thomas, Chief Engineer of the FCC's Office of Engineering and Technology, told members of Congress of important help for amateurs.

"I must not fail to mention the contributions of amateur radio operators to public safety," Thomas said. "The ham radio community has offered invaluable service to, and as, first responders in natural disasters, emergency situations, and other crisis events. Amateur radio operates literally all across the radio spectrum, and these bands are allocated on both a primary and secondary basis. Ham operators even successfully share some of these bands with important federal government operations. ... The Commission recognizes the public service performed by the ham community in times of emergency and looks forward to working with them in the future in this critical area."

Dr. Norman J. Jacknis, Chief Information Officer, Department of Information Technology, of Westchester County, New York said: "In the first hours following the attack of September 11, 2001, the only way we could coordinate the sharing of firefighting, Medical Examiner, (and) Health and Information Technology resources with New York City officials was through the highly

*[1]HR 713, the Amateur Radio Spectrum Protection Act, would direct the FCC to replace with similar spectrum any frequencies reallocated away from the Amateur Radio Service. At press time, it was still in committee.*

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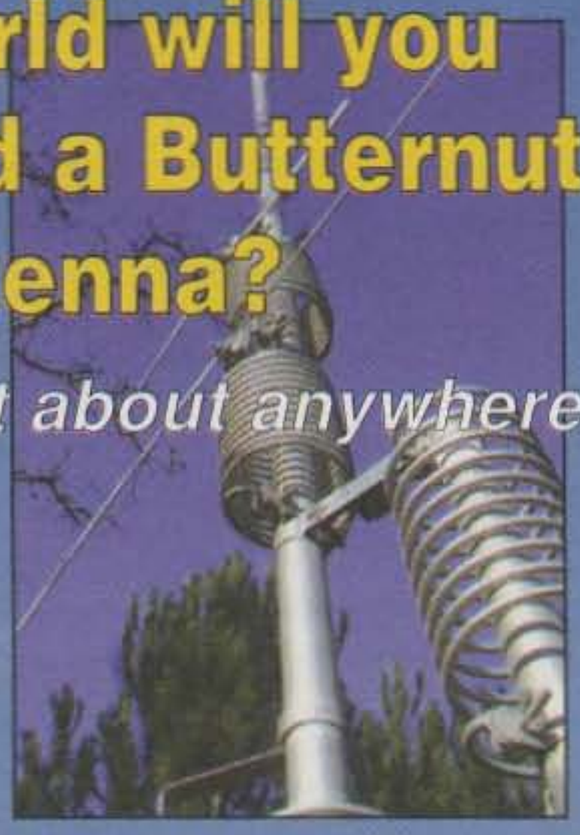

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trained, volunteer amateur radio (ham) operators. This was a result of the fact that normal commercial communications services were unavailable. There was no other single, common communications medium, except the Amateur Radio Service. This irreplaceable resource must be protected against incursion by other interests."

## States Take Emergency Planning Seriously

The Pennsylvania Department of Health recently distributed more than three million copies of a new brochure to help Pennsylvanians become informed and prepared for a natural disaster, a large-scale emergency, or an unexpected attack.

"Pennsylvanians need to know there are well-developed and well-rehearsed emergency response plans at all levels of government," said Governor Ed Rendell. "At the core of this effort is the important issue of citizen preparedness." The brochure says one of the ways citizens can help is to join a Community Emergency Response Team. These teams are being developed around the country and reports indicate that amateur radio is playing an important role.

## International Rules Recognize Amateur Radio Importance

At the recently concluded World Radiocommunication Conference (WRC-03), the International Telecommunications Union made several changes that will enhance the value of amateur radio in emergency communications.

The current ban on international third-party communication in the absence of a specific agreement between the countries involved was replaced by blanket authorization for international third-party traffic in cases of emergency or disaster relief. Routine communications remain banned, except that each country may now "determine the applicability of this provision to amateur stations under its jurisdiction." Thus, any country may now decide that the rule will not apply to its amateurs, freeing them to conduct third-party contacts with stations in any other country that has made the same decision. This eliminates the need for individual, country-by-country agreements. The conference also approved a new regulation specifically promoting the international use of amateur radio in emergencies. The new Article 25.9A reads: "Administrations are encouraged to take the necessary steps to allow amateur stations to prepare for and meet communication needs in support of disaster relief."

## 60 Meters— An Emcomm Resource

While many hams are still thinking about the best way to use the new 60 meter frequencies (see operating guide in last month's *CQ*) for emergency communications, amateurs in the Pacific Northwest have agreed on the following band plan for emergencies:

| Channel | Areas of Operation |
|---|---|
| 5332 | Regional Coordination between sections/states |
| 5348 | Montana/Oregon |

### Weather Spotters in the Right Place

On the evening of May 7, 2003 members of the Texoma Weather Spotters in north Texas were observing some severe weather in Wichita County when one team was alerted by net control to move to another location. The storm they were watching was turning toward the spotters and had produced golf-ball-size hail. Spotters Troy Smith, KD5VUH, and George Witherspoon, WG5K, were traveling north to another location on a two-lane back road when they were passed by a pickup truck traveling at a high rate of speed. As the truck disappeared over a hill, they saw a blue flash of light indicative of a power line being knocked down.

After reaching the top of the hill, they saw the same truck on the side of the highway, where it had come to a stop after hitting a power pole. A young man was lying face down in a ditch and not moving and another was in the truck. While KD5VUH attended to the victim on the ground, WG5K called the net control station (NCS) to report the situation. The NCS dispatched medical help and advised the team that they should soon be getting hail and high winds. Hearing that, Troy moved his vehicle next to the victim and set up a shelter with a foul-weather jacket just as the hail started falling.

At that time two other spotters with emergency medical training arrived and assisted. It turned out that the driver and passenger were not seriously injured and both were released from the local hospital the next day. Before they left the hospital, the spotters were able to visit them and speak to the mother of one of the victims. A week later Troy received a very nice thank you letter from the mom.

*Thanks to Charlie Kosman, WB2NQV*

| | |
|---|---|
| 5368 | Idaho |
| 5373 | Washington |
| 5405 | National/International |

## Coast Guard Auxiliary Communications Test

Members of the United States and Canadian Coast Guard Auxiliaries will test amateur radio emergency communications as part of the International Search and Rescue (ISAR) Competition being held September 26 and 27 in St. John's, Newfoundland. The ISAR brings together the CCGA and the USCGA to compete in a series of tasks that tests

### Coast Guard Special Event Radio Day

Coast Guard Auxiliary groups in the United States and Canada are being urged to set up amateur radio special event stations in connection with the International Search And Rescue (ISAR) competition being held in St. John's, Newfoundland, on September 27. The following operations guide was sent to Coast Guard Auxiliary units interested in operating special event stations:

**Coast Guard Special Event Radio Day Operations Guide**

**Date:** September 27, 2003

**Suggested hours of operation:**
0900–1700 hrs local

**Purposes of Event:**
- Commemorate 64th Anniversary of U.S.C.G. Auxiliary
- Commemorate 25th Anniversary of Canadian C.G. Auxiliary
- Contact International SAR (search-and-rescue) competition station!
- Spread the word on the works and purpose of CG Auxiliary
- Get members and non-members involved with communications

Amateur band HF and VHF operations are permitted.

QSL cards will be supplied to "Special Event Stations."

Invite members and non-members to visit your station. Explain purpose of CG Auxiliary to interested contacts.

Suggested "Call up" will be sent to all participants.

Keep log of all contacts: Callsign, name, location.

Inform contacts to send an "SASE" (self-addressed, stamped envelope) to the person you have selected to distribute the Commemorative QSL. Try to contact as many "Special Event Stations" as possible, especially the ISAR station, VO1SAR.


# TECH TALK

***IC-PW1: No Pain, No Strain, But Plenty of Gain***

**THE CONTESTOR'S FULL GALLON HF + 6M AMP.** Serious hams demand serious performance, even deep into the wee hours of a long contest. The IC-PW1 delivers, offering full duty performance while pushing a full gallon output on all HF bands and 6M! Credit the performance in part to the IC-PW1's large, one piece heat sink. Four PAs are bolted to the sink, all cooled by no less than three thermostatically controlled fans. Two more fans – one for the tuner and one for the power supply, also help keep things cool under contesting pressure. (The tuner fan comes on whenever transmitting, the power supply fan runs continuously.) Yet the footprint of this compact wonder is small enough to sit right next to a desktop contesting station. For even more desktop savings, remote the control head and move the main unit under the desk, out of the way. Your 1 KW station leaves plenty of room for your computer and other essential station equipment!

ICOM IC-PW1(Control head mounted)

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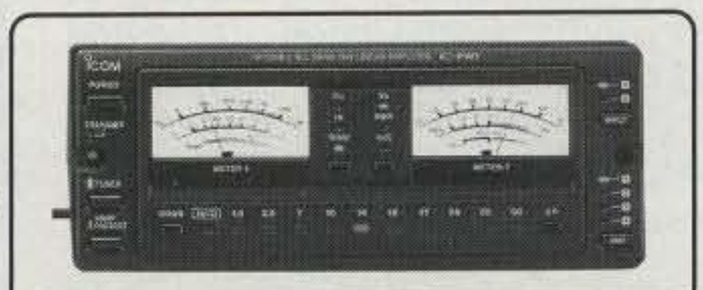

The IC-PW1 remote control head

**DON'T FORGET AUTO LOGGING.** Because the IC-PW1 plugs into an ICOM exciter's CI-V jack, some hams believed they'd have to sacrifice their one-button auto logging. Not so. Simply introduce an optional CT-17 level converter into the mix. Here's how you do it with an IC-756PRO: 1) Make sure the CT-17 is powered up. Connect the CT-17 output 1 to the back of the IC-756PRO and then connect output 2 to the IC-PW1. 2) Power up the IC-756PRO and set up the CI-V communication per the IC-PW1 manual. 3) Power on the IC-756PRO and the IC-PW1. the IC-PW1 will now automatically select the band the IC-756PRO is set to. 4) Start the software, and set the software com port setting to the port you have the CT-17 connected to. The software should recognize the IC-756PRO and show the exact frequency on the computer screen the IC-756PRO is tuned to. 5) As you change bands on either the IC-756PRO or the software, the IC-PW1 will follow that band change. If you change bands on the software, both the IC-756PRO and the IC-PW1 will follow that band change.

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*VE7MRQ and VE7CYU participate in local emergency-preparedness exercises in connection with the International Search and Rescue competition, last held in British Columbia. This year's event will be in Newfoundland, with participation by SONRA, the Society of Newfoundland Radio Amateurs.*

their members' search-and-rescue and emergency-preparedness skills.

In the United States, even though members of the Coast Guard Auxiliary do not use amateur radio frequencies for sending emergency traffic, they have "monitored amateur radio transmissions relating to hurricanes in the Caribbean and the southeastern United States and passed relevant information to a Coast Guard Crisis Action Center," says Eric Glasscott, Branch Chief of the USCGA's Office of Telecommunication Technology, adding, "Any bit of information can help in preparing to respond to an emergency."

"The goal of the event is to promote the good work of the auxiliary, to raise the level of awareness of the general public and government agencies to the capabilities of amateur radio in providing emergency communications during emergency/disaster situations, and to simply enjoy the event in terms of fellowship," says Glasscott. "For radio amateurs, the event provides an opportunity to learn about the Auxiliary, to work as many Auxiliary stations as possible in the spirit of competition, and to obtain a special event QSL card."

Amateur radio activity at the ISAR event will be coordinated by the Society of Newfoundland Radio Amateurs (SONRA).

"We see our involvement in this event as a training opportunity," says SONRA President Paul Webster, "as well (as) a chance to develop relationships with other organizations that might be involved in emergency/disaster situations, to work with international operators from the United States, and to share best practices."

SONRA members provided communications between various relief agencies and different sites following the September 11 terrorist attacks on the United States. Over 75 aircraft were diverted to the airports in Newfoundland when U.S. airspace was closed to all airline traffic.

SONRA will set up a station at the Canadian Coast Guard South Side Facility, on St. John's Harbor, on Friday, September 26 and at the Royal Newfoundland Yacht Club in Manuels, just outside of St. John's, the next day. Operations will be on HF and VHF as well as several IRLP Nodes (see sidebar for details).

*Canadian hams help keep CG7SAR on the air. This was the special event station for the last International Search and Rescue competition. Another competition, complete with special event station VO1SAR, will be held September 27 in St. John's, Newfoundland.*

## In the Public Interest

This month we focused on national and international activities which may impact the work we do as amateur radio operators. Now that we have pointed out some of the activity at the national level, it's time for you to play a part on the local level. We would like to thank François Vézina, VE2JRK; Jessica Hume; Dan Amoroso, NM3S; Charlie Kosman, WB2NQV; and the ARRL for their input. Until next time...

73, Bob, WA3PZO

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*1.5 W/144 MHz, 1 W/430 MHz

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BY FREDERICK O. MAIA,* W5YI

# WRC-2003 Removes International Morse Code Exam Requirement; Begins 40 Meter Realignment

Representatives of the world's governments met in June and early July to decide a variety of international radio regulation questions, including several affecting the Amateur Radio Service. When the delegates went home, the mandatory Morse code requirement in international law for amateur HF access was gone, replaced by a rule saying that any administration that feels it needs to keep the requirement has the right to do so. In addition, the delegates started a six-year process to move international broadcasters off 7100–7200 kHz. This month we present details and background of the decisions made at WRC-03.

## An Overview

After four weeks of negotiations, this year's World Radiocommunication Conference (WRC-03)—a roughly triennial meeting sponsored by the International Telecommunications Union (ITU) to revise the global radio regulations and spectrum rules—concluded with a blueprint for the global radiocommunication sector that reflects its current and future needs.

The ITU's World Radiocommunication Conference allocates and manages the radio spectrum on a global basis for a variety of wireless uses, products, and technology. WRC-03 was held at the Geneva International Conference Center adjacent to ITU Headquarters.

The WRC is the international forum where the various member countries meet to revise an international treaty known as the international Radio Regulations (RR). The Radio Regulations do not in and of themselves impose obligations on amateurs. Instead they provide guidelines to the various telecommunications agencies of the world on how they are to regulate their radio services. International coordination is necessary because radio waves do not respect national borders.

The RR contain frequency allocations and the regulatory framework for more than 40 radiocommunication services ranging from amateur and professional radio services to mobile wireless technologies and satellite communications.

A number of landmark decisions were taken by the conference to deal with the increasing pressure placed on the radio frequency spectrum, which is a limited natural resource. The demand for spectrum is the result of the exponential growth of information and communication technologies. This was reflected in an unprecedented number of agenda items and the more than 2500 proposals from member states.

Topping the agenda were the frequencies governments and industries will use for services such as Wi-Fi (wireless broadband), the European-Union-backed Galileo satellite navigation system, internet access for airline passengers, digital broadcasting below 30 MHz, global positioning, and dozens of issues of lesser importance.

The 189 countries affiliated with the ITU sent delegations to the conference totaling more than 2600 participants armed with their national, regional, and global priorities and proposals for spectrum use. In addition, regional telecommunications organizations and standards bodies lobbied behind the scenes. The first order of business was to elect a Conference Chairman, and Dr. Veena Rawat of Canada was elected by acclamation.

The conference agenda was the largest ever. While WRC 1997, held in Istanbul, Turkey, had 12 agenda items and WRC 2000 had approximately 20 items, WRC 2003 addressed and resolved 48 major issues.

The U.S. delegation, led by Ambassador Janice Obuchowski, was the largest—over 170 representatives from the information, communications, and aerospace sectors, along with various government agencies. An intense WRC-03 preparation period taking more than two years was spearheaded by the Department of State, the Federal Communications Commission (FCC), and the Commerce Department's National Telecommunications and Information Administration (NTIA). The U.S. position was supported by input from amateur, commercial, and federal spectru m users.

## Amateur Radio Issues at WRC-03

Although amateur radio matters were but a small part of the conference, several items on the conference agenda were of great importance to radio amateurs. As a result, the International Amateur Radio Union fielded its largest team of observers at an ITU conference in more than a decade. The IARU is a federation of national amateur radio societies from around the world.

The two high-profile agenda items that were especially important to ham radio were realignment of 7 MHz allocations (Agenda Item 1.23) and the revision of Article 25, the international regulations governing the amateur and amateur-satellite services (Agenda Item 1.7). Article 25 also contains the requirement that radio amateurs operating on the high-frequency ham bands be proficient in Morse code.

Other less-important agenda items were expanding the format for amateur station callsigns (Agenda Item 1.72), an allocation for satellite-borne synthetic aperture radars (SARs) in the 70 cm band (Agenda Item 1.38), the drafting of an agenda for

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the next WRC (scheduled for 2007 [Agenda Item 7.2]), and the revision of footnotes to the Table of Frequency Allocations (Agenda Item 1.1).

## The Morse Code Requirement

Over the last 50 years the ITU has reviewed and relaxed the amateur Morse requirement at every international conference capable of doing so. In 1947 (Atlantic City) the ITU member states agreed that Morse proficiency should only be required when the operation took place on frequencies below 1000 MHz (1 GHz). At the 1959 World Administrative Radio Conference this level was dropped to 144 MHz. A further reduction was made at WARC-79 to its present 30 MHz.

The radiotelegraphy requirement in the Amateur Service has its roots—and the roots of it demise—in maritime communications. In the early days of radio ocean-going ships communicated by radiotelegraphy on 500 kHz, and it was deemed important that radio amateurs prove their ability to also transmit and receive in Morse code.

On November 9, 1988 at the conclusion of a two-week conference of the London-based International Maritime Organization (IMO), it was decided to convert maritime communications from Morse code to the satellite-based GMDSS (Global Maritime Distress and Safety System). In 1999 the U.S. Coast Guard discontinued monitoring 500 kHz, and radio amateurs remained the sole radio service requiring Morse code proficiency.

*The old Article 25 of the Radio Regulations, in effect until July 4, 2003, read:*

**ARTICLE 25**
**Amateur services**

**Section I. Amateur Service**

25.1 § 1. Radiocommunications between amateur stations of different countries shall be forbidden if the administration of one of the countries concerned has notified that it objects to such radiocommunications.

25.2 § 2. 1) When transmissions between amateur stations of different countries are permitted, they shall be made in plain language and shall be limited to messages of a technical nature relating to tests and to remarks of a personal character for which, by reason of their unimportance, recourse to the public telecommunications service is not justified.

25.3 2) It is absolutely forbidden for amateur stations to be used for transmitting international communications on behalf of third parties.

25.4 3) The preceding provisions may be modified by special arrangements between the administrations of the countries concerned.

25.5 § 3. 1) Any person seeking a license to operate the apparatus of an amateur station shall prove that he is able to send correctly by hand and to receive correctly by ear, texts in Morse code signals. The administrations concerned may, however, waive this requirement in the case of stations making use exclusively of frequencies above 30 MHz.

25.6 2) Administrations shall take such measures as they judge necessary to verify the operational and technical qualifications of any person wishing to operate the apparatus of an amateur station.

25.7 § 4. The maximum power of amateur stations shall be fixed by the administrations concerned, having regard to the technical qualifications of the operators and to the conditions under which these stations are to operate.

25.8 § 5. 1) All the general rules of the Constitution, the Convention, and of these Regulations shall apply to amateur stations. In particular, the emitted frequency shall be as stable and as free from spurious emissions as the state of technical development for such stations permits.

25.9 2) During the course of their transmissions, amateur stations shall transmit their callsign at short intervals.

**Section II. Amateur-Satellite Service**

25.10 § 6. The provisions of Section I of this Article shall apply equally, as appropriate, to the amateur-satellite service.

25.11 § 7. Space stations in the amateur-satellite service operating in bands shared with other services shall be fitted with appropriate devices for controlling emissions in the event that harmful interference is reported in accordance with the procedure laid down in Article 15. Administrations authorizing such space stations shall inform the Bureau and shall ensure that sufficient earth command stations are established before launch to guarantee that any harmful interference which might be reported can be terminated by the authorizing administration (see No. 22.1).

*New text for Article 25 of the Radio Regulations, effective July 5, 2003:*

**ARTICLE 25**
**Amateur services**

**Section I. Amateur Service**

25.1 § 1. Radiocommunications between amateur stations of different countries shall be permitted unless the administration of one of the countries concerned has notified that it objects to such radiocommunications.

25.2 § 2. 1) Transmissions between amateur stations of different countries shall be limited to communications incidental to the purposes of the amateur service, as defined in No. 1.56 and to remarks of a personal character.

25.2A 1) Transmissions between amateur stations of different countries shall not be encoded for the purpose of obscuring their meaning, except for control signals exchanged between earth command stations and space stations in the amateur-satellite service.

25.3 2) Amateur stations may be used for transmitting international communications on behalf of third parties only in case of emergencies or disaster relief. An administration may determine the applicability of this provision to amateur stations under its jurisdiction.

25.4 SUP (*Suppressed, meaning eliminated*)

25.5 § 3. 1) Administrations shall determine whether or not a person seeking a license to operate an amateur station shall demonstrate the ability to send and receive texts in Morse code signals.

25.6 2) Administrations shall verify the operational and technical qualifications of any person wishing to operate an amateur station. Guidance for standards of competence may be found in the most recent version of Recommendation ITU-R M.1544.

25.7 § 4. The maximum power of amateur stations shall be fixed by the administrations concerned.

25.8 § 5. 1) All pertinent Articles and provisions of the Constitution, the Convention, and of these Regulations shall apply to amateur stations.

25.9 2) During the course of their transmissions, amateur stations shall transmit their callsign at short intervals.

25.9A Administrations are encouraged to take the necessary steps to allow amateur stations to prepare for and meet communication needs in support of disaster relief.

25.9B An administration may determine whether or not to permit a person who has been granted a license to operate an amateur station by another administration, to operate an amateur station while that person is temporarily in its territory, subject to such conditions or restrictions it may impose.

**Section II. Amateur-Satellite service**

25.10 § 6. The provisions of Section I of this Article shall apply equally, as appropriate, to the amateur-satellite service.

25.11 § 7. Administrations authorizing space stations in the amateur-satellite service shall ensure that sufficient earth command stations are established before launch to ensure that any harmful interference caused by emissions from a station in the amateur-satellite service can be terminated immediately (see No. 22.1).

## On The Cover

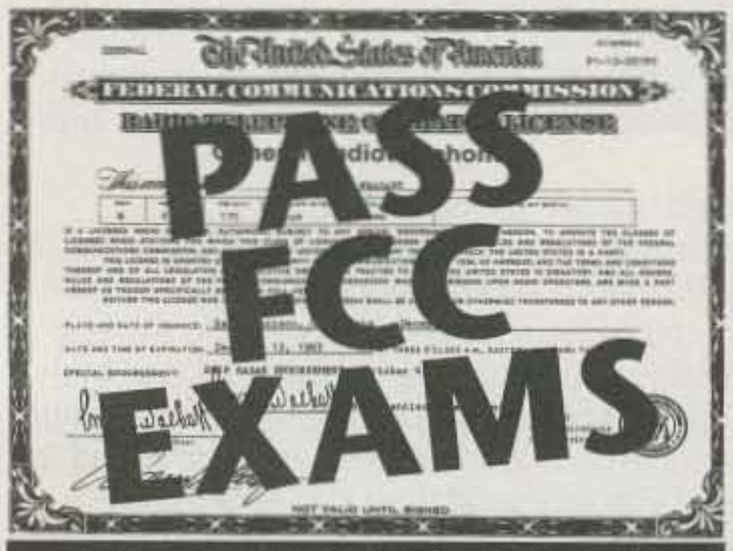
On this month's cover, Mike Youngs, KK7VZ, shows off his shack at his home QTH of North Salt Lake, Utah. Mike, a retired telephone engineer who built systems for Qwest, first got into ham radio through his volunteer job as a scoutmaster, where he saw its effectiveness for communications in remote areas. He got his Technician Class license to use for scout activities, and was then "bit by the bug," as he says, and became active in other parts of ham radio.

Mike is now into PSK-31, and has a full-time packet station, used mostly for DX spotting. He uses an ICOM 706 and a 5-watt Kenwood radio for the packet system, as well as computer equipment not visible in the cover picture. He does most of his DXing on a Kenwood TS-570. (The round thing in the foreground is a magnifying work light.) Mike also dabbles in amateur TV, and likes to do public service. He has a portable weather-proof box which contains nearly as much radio equipment as his shack and can be set up anywhere. Mike says he helped with communications in the aftermath of the September 11, 2001 terrorist attacks.

During the 2002 Winter Olympic Games in Salt Lake City, Mike got the chance to provide some very exciting public service. He volunteered to help with communications during the Games, and used his skills in building systems to assemble and operate a video wall for the security forces' emergency center. He shared the task of operating it with an FBI agent.

Mike was also placed in charge of mountaintop surveillance at the Olympics. He was in control of sensitive communications on 14 peaks in the Wasatch Mountains around Salt Lake City. He and his fellow workers finished setting up the radio equipment about a week before the Games began ... then had to tear it all down as soon as they were over. —*Dan Moseson*

*(Cover photo by Larry Mulvehill, WB2ZPI)*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Almost all of the critical WRC-03 agenda items for amateur radio were considered in the conference's Committee 4, chaired by Germany's Eberhard George, DL7IH. His selection to chair a key committee was based on his years of experience in ITU affairs, however, and not on his holding an amateur radio license. George, a member of Germany's national amateur radio society, the Deutscher Amateur Radio Club (DARC), was chairman of their national preparatory group for WRC-03 and is an officer of Germany's Federal Ministry of Economics and Labor.

DARC generally favored retention of the Morse code requirement for HF amateur radio operation, but this view was not shared by DL7IH. In fact, his personal position was to abolish S25.5, which contains the code requirement, or at least modify it so that each administration can decide independently. In his official German government capacity, he had told the DARC several times that Germany would not continue CW exams after a WRC-03 decision abolishing the requirement.

Bloc voting seemed to be the rule at WRC-03, with most of the world's countries affiliating themselves with neighboring nations. There were five major regional blocs of varying size and importance: an Arab Group, an Asia-Pacific Group (APT), an Inter-American Group (CITEL), an African Group, and a European Group (CEPT). Most of the groups seemed to lean toward some language leaving the decision up to individual governments.

The Arabs, for example, wanted the Morse code requirement (S25.5) modified to: "Administrations shall determine whether or not a person seeking a license to operate an amateur station shall prove that this person is able to correctly send texts in Morse code signals."

India proposed rewording S25.5 to read: "Administrations may determine the requirement of a person, seeking a license to operate the apparatus of an amateur station, whether he or she shall prove the ability to send correctly by hand and to receive by ear, texts in Morse code signals." They added: "Morse code is no longer mandatory but if an administration chooses to require Morse code, it will be the concern of administration to apply such a rule and not an international obligation."

An African Group (primarily consisting of the Republic of Kenya, the Republic of Uganda, and the United Republic of Tanzania) supported modification of S25.5 to "...give administrations the powers to determine the requirements

*Relevant Text of ITU Recommendation ITU-R M.1544:*

**Minimum qualifications of radio amateurs**

The ITU Radiocommunication Assembly,

*considering*

...c) that certain minimum operator operational and technical qualifications are necessary for proper operation of an amateur or amateur-satellite station,

*recommends*

**1** that administrations take such measures as they judge necessary to verify the operational and technical qualifications of any person wishing to operate an amateur station;

**2** that any person seeking a license to operate an amateur station should demonstrate theoretical knowledge of:

Radio Regulations
- international
- domestic

Methods of radiocommunication
- radiotelephony
- radiotelegraphy
- data and image

Radio system theory
- transmitters
- receivers
- antennas and propagation
- measurements

Radio emission safety

Electromagnetic compatibility

Avoidance and resolution of radio frequency interference.

needed, i.e., Morse code knowledge to any persons seeking license to operate an amateur station. This will ensure that Morse code skills are maintained, where appropriate."

The Asia-Pacific Common Proposal was to "suppress" (or eliminate) the Morse requirement. "The question of whether there should be a domestic Morse code requirement should be left up to administrations, " it said, adding, "...this would give administrations further flexibility in revising and updating the qualifications related to the use of Morse code, and may encourage the development of amateur services."

The Asia-Pacific Group did, however, support the so-called "Incorporation by Reference" of a range of minimum amateur radio qualifications. Their proposed S26.6 read: "Administrations shall verify the operational and technical qualifications of any person wishing to operate an amateur station. Standards of competence are contained in the most recent version of Recommendation ITU-R M.1544." Mandatory Incorporation by Reference was supported by the IARU, but not the U.S. delegation.

The (ITU Region 2) Inter-American Group (CITEL) proposal, like that from the Asia-Pacific Group, supported "sup-



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pression" of the code requirement "(t)o eliminate the requirement to prove Morse code ability and to leave this matter to administrations." There was no mention of M.1544 or its mandatory Incorporation by Reference.

The Russian Federation (consisting of ten countries) wanted "No Change" to the Morse code requirement. They cryptically said in their proposal, "Retain the provision on the need for persons seeking to obtain an amateur license to prove their knowledge of Morse code. However, the need for such verification should be left up to individual administrations."

### The U.S. Position at WRC-2003

By far, the biggest document input on Agenda Item 1.7 came from the United States of America delegation. It reminded the group that this matter had been under discussion at the WRC level for nearly a decade. "At WRC-95," the U.S. wrote, "one administration (without naming New Zealand) proposed to delete from Article 25 the requirement that amateurs demonstrate Morse code capability to be licensed to operate on frequencies below 30 MHz. Instead, a review of Article 25 was placed on the preliminary agenda for WRC-99. At WRC-97 this agenda item was moved to the preliminary agenda for WRC-01. At WRC-2000 the item was confirmed on the agenda for WRC-03."

Article 25, the International Amateur Radio framework, contains 11 paragraphs, only one of which relates to the Morse code requirement. The U.S. statement continued:

In 1996, the International Amateur Radio Union (IARU), an ITU Sector Member, initiated a review of the entire Article by publishing a discussion paper and soliciting comment. Several restatements of the paper and discussions at three regional conferences over a three-year period culminated in the adoption of a consensus view in 1998. This consensus view supports the following principles:

• Retention of the requirement that administrations shall verify the technical and operational qualifications of any person wishing to operate an amateur station. The specific qualifications are subject to change over time and more appropriately belong in an ITU-R Recommendation. Accordingly, Recommendation ITU-R M.1544, Minimum Qualification of Radio Amateurs, was developed in Working Party 8A.

• Protection of the non-commercial nature of the amateur and amateur-satellite services.

• Inclusion of specific provisions to recognize the disaster communications role of the amateur service and to facilitate global roaming by amateur stations.

• Relief from existing prohibition on transmitting international communications on behalf of third parties.

• Elimination of the provision forbidding radiocommunications between amateurs of different countries if the administration of one of the countries has notified that it objects to such communications.

• Elimination of redundant provisions that simply repeat regulations that apply generally to all radio services.

The U.S. proposed to simplify Article 25.and to totally "...eliminate the requirement to prove Morse code ability and to leave this matter to administrations" and did not support the mandatory Incorporation by Reference of M.1544, the minimum knowledge requirements for holding an amateur radio license (see sidebar for text).

## Amateur Radio Actions At WRC-03

Here is a summary of final conference action on the various WRC-03 agenda items impacting amateur radio:

**Agenda Item 1.7: (Article 25)** It was resolved to leave to the discretion of the individual countries whether it would be necessary to demonstrate knowledge of Morse code in order to be granted an amateur radio operator's license.

The conference agreed to accept M.1544 as "guidance" only when determining operator qualifications. It is therefore not mandatory that administrations accept the various "standards of competence" topics contained in the Recommendation.

The Recommendation provides that any person seeking a license to operate an amateur station should demonstrate a "theoretical knowledge of: Radio regulations, international, domestic," and under the heading *Radio system theory,* "transmitters, receivers, antennas, and propagation and measurements."

After three weeks of negotiations, on June 27 a complete text for Article 25 was finally agreed to in Committee 4. Some of the wording is the result of delicate compromises. Both the previous and new Article 25 appear in this column in sidebars.

**Agenda Item 1.72: (Article 19.68)** A modification was approved that permits an amateur callsign suffix of "...not more than four characters, the last of which shall be a letter...." A provision was also made for temporary use of more than four suffix characters on special-event occasions.

**Agenda item 1.7.3: (Article 1)** It was agreed that the definition of the amateur services remained relevant and appropriate. No changes were made. They remain:

*1.56 Amateur Service:* A radiocommunication service for the purpose of self-training, intercommunication, and technical investigations carried out by amateurs, that is, by duly authorized persons interested in radio technique solely with a personal aim and without pecuniary interest.

*1.57 Amateur-Satellite Service:* A radiocommunication service using space stations on earth satellites for the same purposes as those of the Amateur Service.

**Agenda Item 1.23: (7 MHz realignment)** The conference took a major decision to add 100 kHz of bandwidth to the Amateur Service on a global basis.

When the change takes effect in 2009, there will be a dramatic improvement in the 40 meter band! The conference agreed to shift broadcasting stations in Regions 1 and 3 out of the 7100–7200 kHz band and to reallocate the band to the Amateur Service in those two regions. The allocation in Region 2 of 7000–7300 kHz remains exclusively amateur.

The HF Broadcasting band in Regions 1 and 3 will become 7200–7450 kHz and in Region 2 it will be 7300–7400 kHz. The change will take effect on March 29, 2009. In Regions 1 and 3 the 7100–7200 kHz band will become exclusively amateur on that date.

Never before in the history of radiocommunication has an HF broadcasting band been shifted to accommodate the needs of another service.

**Agenda item 1.36: (HF broadcasting expansion around 4 to 10 MHz)** Most delegations came to the conference with positions opposing additional HF spectrum for broadcasting. A resolution was adopted inviting the next WRC to consider additional spectrum requirements for broadcasting between 4 and 10 MHz. However, as noted below, the realignment of 40 meters will *not* be on the table at that time.

**Agenda item 1.38: (70-cm SARs)** SARs are satellite-borne synthetic aperture radars. The conference agreed to permit their operation at 432– 438 MHz. However, the SARs allocation will be secondary and subject to limitations spelled out in Recommendation ITU-R SA.1260-1 that are designed to provide protection to, among others, the Amateur and Amateur-Satellite Services.

## Looking Ahead to WRC-Next

The next WRC is scheduled for 2007, although there was some discussion about holding it a year later for budgetary purposes.

HF matters will again be on the agenda for WRC- 07, subject to the approval of the ITU Council, but the band 7000 to 7200 kHz will be excluded from this study. It does, however, give the opportunity to realign the 40 meter amateur allocation in ITU Regions 1 and 3 with that of Region 2. This means the long-sought "harmonized" 40 meter band with a worldwide allocation from 7000 to 7300 kHz remains a possibility for discussion the next time the world's radio regulators meet to refine the "rules of the game." However, this is far from a certainty. 73, Fred, W5YI


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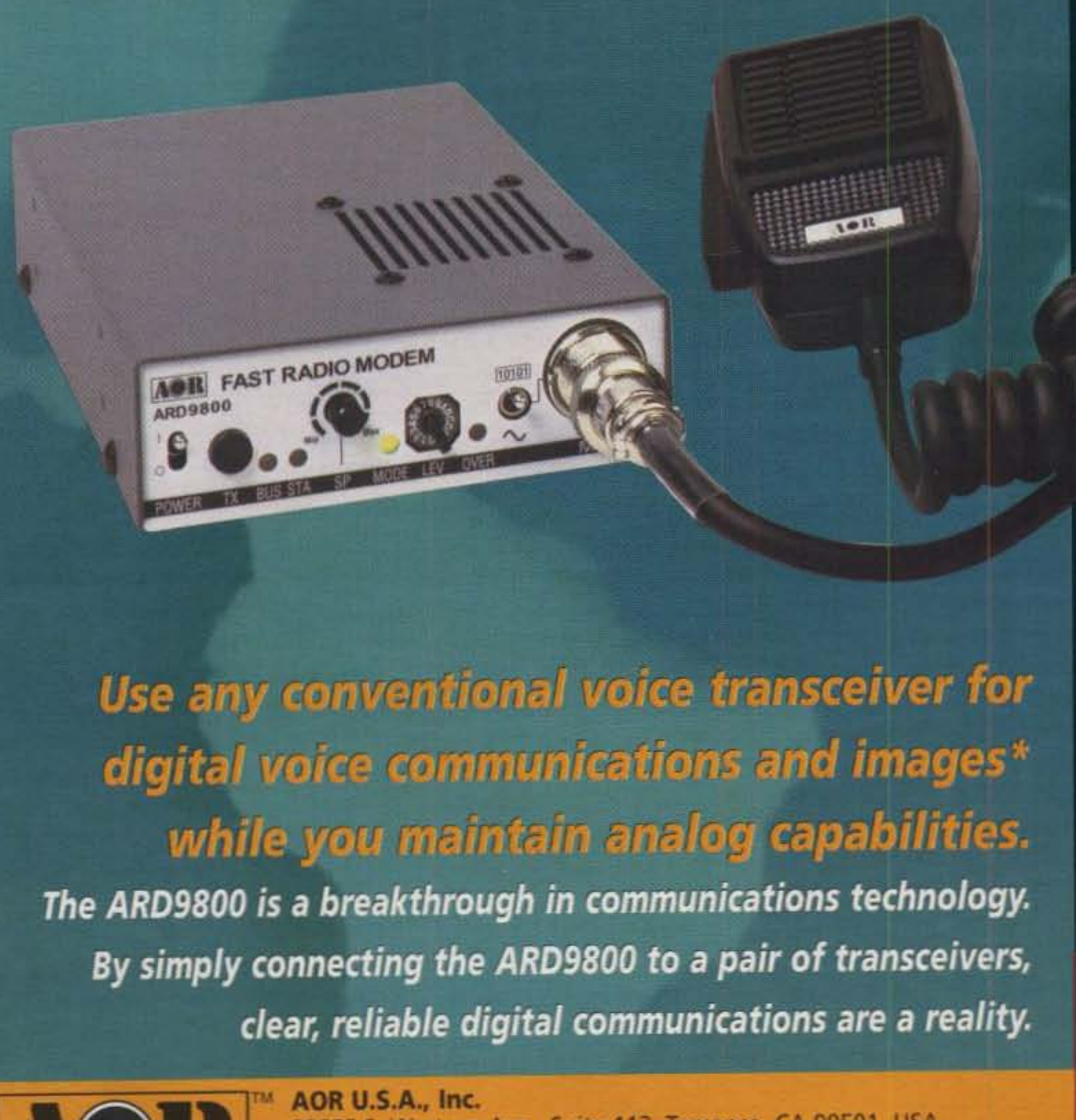


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# math's notes

BY IRWIN MATH,* WA2NDM

# Temperature Measurements

It's funny how the heat of this past summer (at least here in the northeast) reminds one of the heat generated by some of the circuits we build. Sometimes this is inadvertent, but at other times we intentionally overstress components—particularly, for example, when trying to squeeze the last drop of output power from an amplifier. As this type of practice can severely affect the reliability of a design, we thought it a good idea to come up with an inexpensive way for the experimenter to accurately measure the temperature of a component. That way one can operate a component up to its maximum rating when necessary. Such a thermometer can prove a valuable addition to the experimenter's lab, and fortunately there exist devices that are simple to use and do not require elaborate additional circuitry to make them work.

One of these is the National Semiconductor LM335. This component is described by the manufacturer as a "precision temperature sensor," and as you soon will see, it is ideally suited for our needs. The version that we recommend comes in a TO-92 package (the common plastic transistor package with which we are all familiar), although a surface-mount package as well as a metal-case version are also available. The LM335 is actually a specialized integrated circuit that can be thought of as a temperature-varying zener diode. The TO-92 version of this IC is linear and usable over a range of –40° to +100°C, while other versions can operate from –55° to +125°C. Accuracy is within 1°C over the entire range, certainly close enough for most experimental measurements. Fig. 1 shows the symbol and pin connections for the TO-92 version.

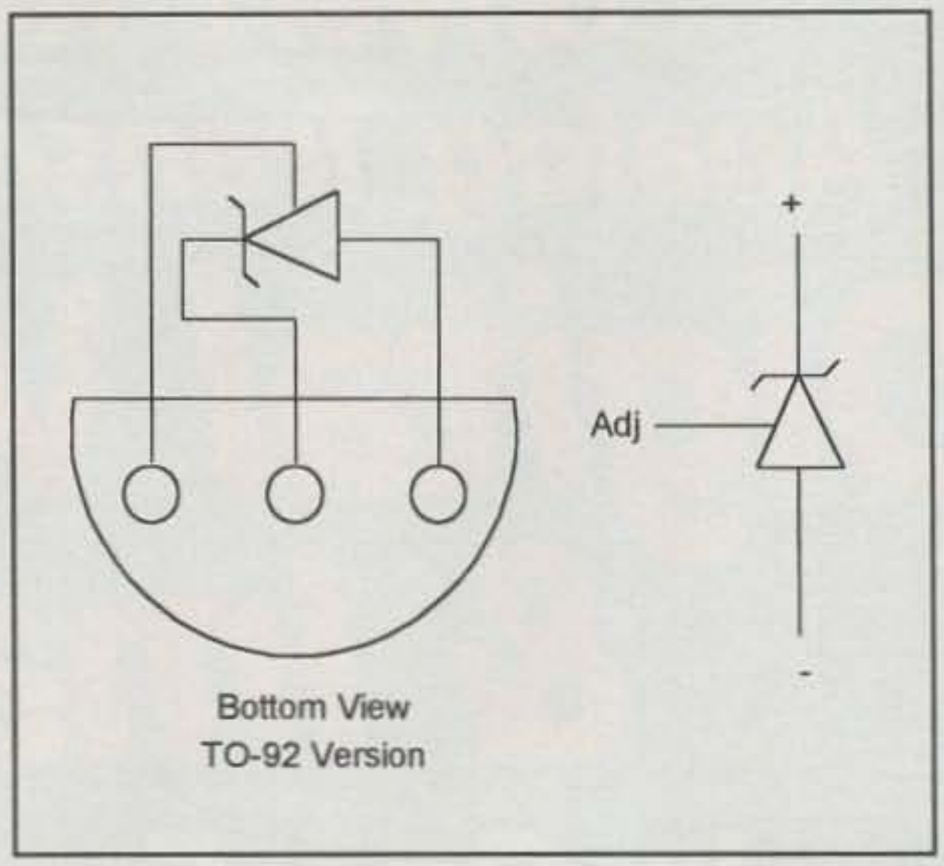


*Fig. 1– Pin connections and symbol for the LM335.*

Fig. 2 is the basic circuit of a centigrade thermometer. A reference diode and op-amp are used to provide a calibrated voltage for the LM335, and a digital voltmeter (DVM) provides a direct indication of temperature. To set up the circuit, adjust the 2K pot for a voltage reading of 2.732 volts between pin 6 of the op-amp and ground with a DVM. Next place the LM335 in a known temperature and adjust the 10K pot for the correct reading on the DVM used for the measurements. If you do not have access to an accurate thermometer to determine the correct temperature at which to calibrate the circuit, simply prepare a mixture of crushed ice and water. Stir the mixture so that you have a good slurry of both ice and water (sort of like slush or

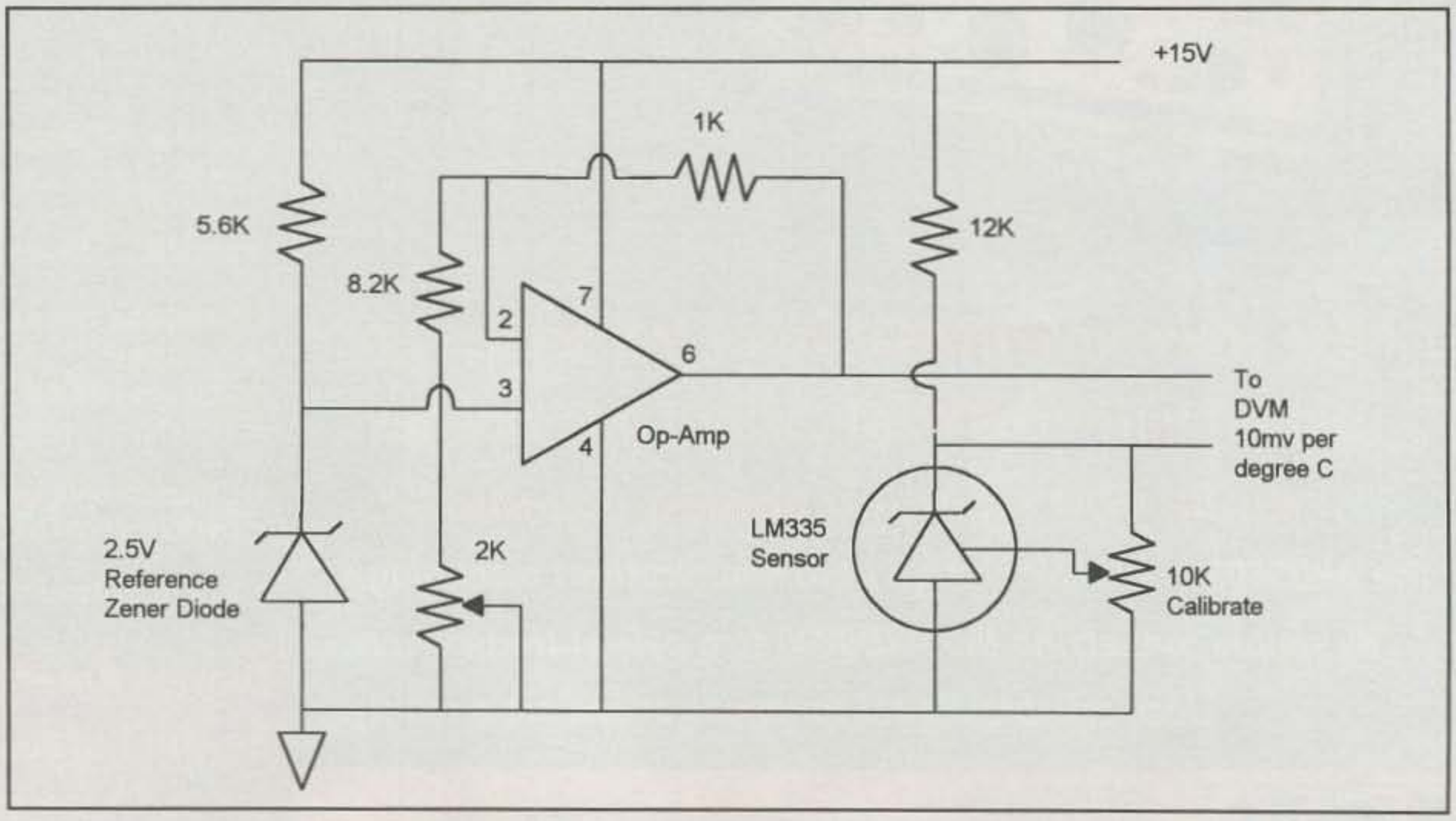


*Fig. 2– Centigrade electronic thermometer.*

*c/o CQ magazine



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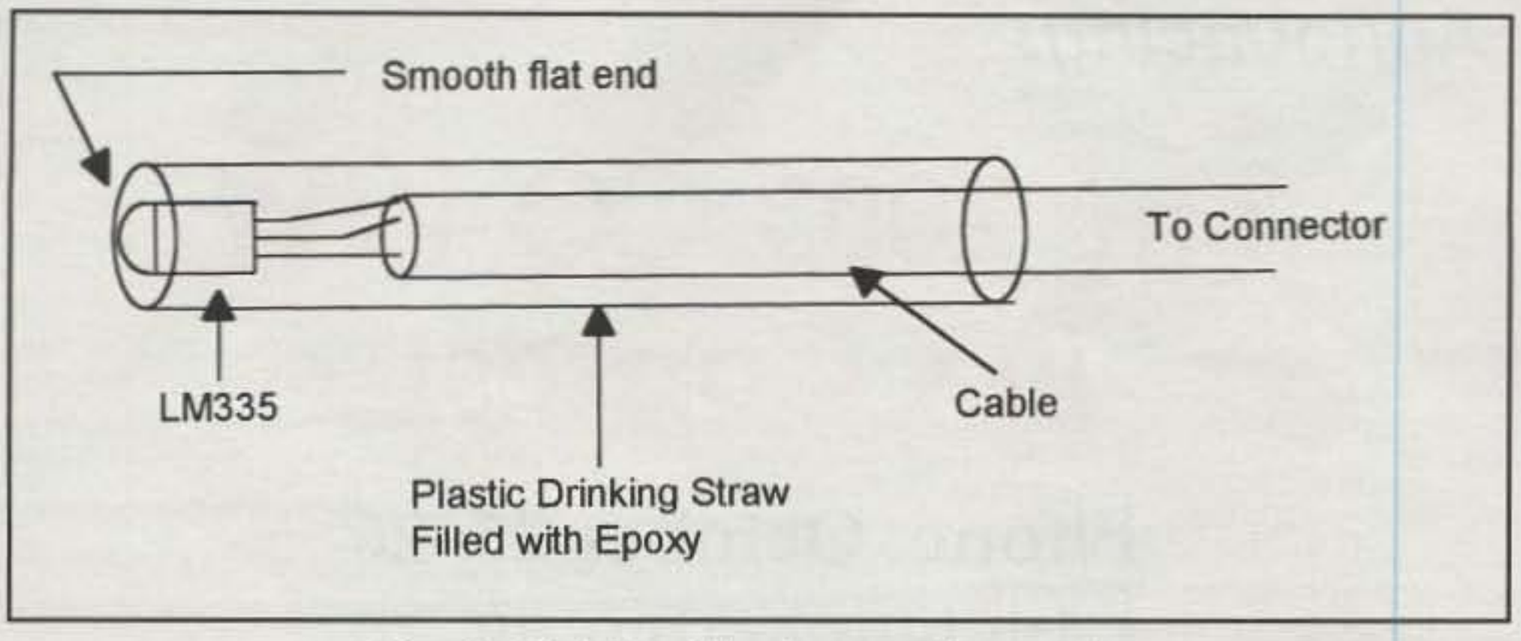


*Fig. 3– Details of the temperature probe.*

sleet). The temperature of such a slurry is very close to 0°C (32°F), and as a result can be used to calibrate the thermometer at this point.

For ease of using the thermometer it is a good idea to enclose the LM335 in a probe-type housing. To make a suitable probe obtain a common plastic drinking straw and cut it to a length of 6 inches. Next close one end of the straw with a small piece of masking tape. Solder wires to the LM335 using a 3 foot length of two-conductor shielded wire. Connect the conductors to the Adj ("emitter") and + ("base") leads and the shield to the – ("collector") lead. Be sure that the leads do not short to one another. Now liberally coat the entire assembly with epoxy and slide it into the open end of the straw until the top of the TO-92 housing just makes contact with the masking tape. If necessary, fill the rest of the straw with epoxy so you have a completely enclosed assembly. When the epoxy hardens, remove the masking tape and clean the end. If needed, add a bit more epoxy and then lightly sand the end to obtain a smooth, flat finish. Don't worry if while sanding you remove a slight bit of the TO-92 case. The result should be a reasonably rugged probe that will be waterproof and insulated. A three-pin connector on the cable and a mating three-pin connector on the thermometer enclosure is now all that is necessary to complete the project.

Fig. 3 is a diagram of the details of such a probe. To make a measurement, lightly press the tip of the probe on the component you wish to check and wait for the reading to become stable. A bit of silicon grease on the probe tip often will make better thermal contact and result in a more accurate reading.

For those of you who want a Fahrenheit thermometer, the circuit of fig. 4 should suffice. Although sensitivity is less (only 1 millivolt per degree F), the circuit does not require an op-amp. You will have to find a 4.55K resistor, however, or make up one of a series/parallel combination.

In this circuit a reference voltage of 2.554 volts is required and provided by an LM336 adjustable reference. To calibrate the thermometer you must first adjust the 10K "Adj" pot for exactly 2.554 volts across the LM336. Then place the LM335 in a known temperature and set the 10K "Cal" potentiometer for the correct reading (in degrees F). If you use the ice mixture previously described, the set point would be 32°F.

Although the above circuitry is fairly simple, the accuracy one can achieve is quite impressive. For additional circuits and more details regarding the versatile LM335 be sure to visit National Semiconductor's website at <www.national.com> and download the data sheet. 73, Irwin, WA2NDM

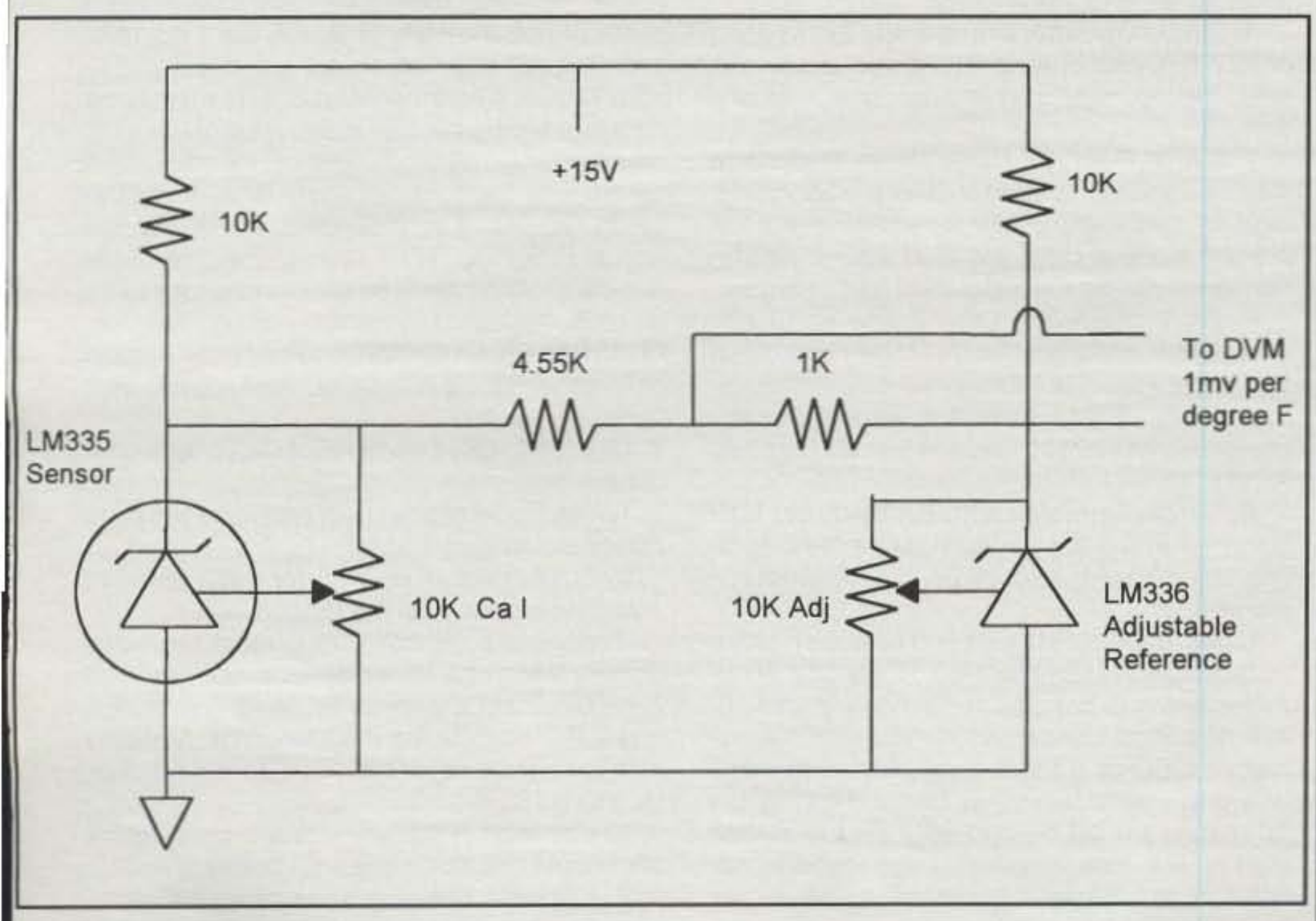


*Fig. 4– Simple Fahrenheit thermometer.*

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# The 2003 CQ WW DX Contest

## Phone: October 25–26
## CW: November 29–30

## Starts 0000 GMT Saturday
## Ends 2400 GMT Sunday

**I. OBJECTIVE:** For amateurs around the world to contact other amateurs in as many zones and countries as possible.

**II. BANDS:** All bands, 1.8 through 28 MHz, except for WARC bands.

**III. TYPE OF COMPETITION** (choose only one):

**For all categories:** All entrants must operate within the limits of their chosen category when performing any activity that could impact their submitted score. *All high power categories must not exceed 1500 watts total output power on any band.* Transmitters and receivers must be located within a 500 meter diameter circle or within the property limits of the station licensee's address, whichever is greater. All antennas used by the entrant must be physically connected by wires to the transmitters and receivers used by the entrant. Only the entrant's callsign can be used to aid the entrant's score. A different callsign must be used for each CQ WW entry.

**A. Single Operator Categories:** Single band or all band; only one signal allowed at any one time; the operator may change bands at any time.

1. Single Operator High: Those stations at which one person performs all of the operating, logging, and spotting functions. The use of DX alerting assistance of any kind places the station in the Single Operator Assisted category.

2. Single Operator Low: Same as III A 1 except that the output power shall not exceed 100 watts (see rule XI.11).

3. QRPp: Same as III A 1, except that the power output must not exceed 5 watts (see rule XI.11).

**B. Single Operator with DX Spotting Net:** Same as III A 1 except the passive (self- spotting not allowed) use of DX spotting nets is allowed.

**C. Multi-Operator** (all band operation only):

1. Single Transmitter (*MS*): Only one transmitter and one band permitted during any 10-minute period, defined as starting with the first logged QSO on a band. Exception: One—and only one—other band may be used during any 10-minute period if—and only if—the station worked is a new multiplier. Logs found in violation of the 10-minute rule will automatically be reclassified as multi-multi.

2. Two Transmitter (*M2*): A maximum of two transmitted signals at any time on different bands. Both transmitters may work any and all stations. A station may only be worked once per band regardless of which transmitter is used. Each of the two transmitters used must keep a separate chronological log for the entire contest period, or if electronic logging is used, the electronic log submittal (Cabrillo) must indicate which transmitter made each QSO. Each transmitter may make a maximum of 8 band changes in any clock hour (00 through 59 minutes).

3. Multi-Transmitter *(MM):* No limit to transmitters, but only one signal and running station allowed per band.

**D. Team Contesting:** A team consists of any five radio amateurs operating in the single operator category. A person may be on only one team per mode. Competing on a team will not prevent any team member from submitting his/her personal score for a radio club. A team score will be the sum of all the team member scores. SSB and CW teams are totally separate. That is, a member of an SSB team may be on a totally different CW team. A list of a team's members must be received at CQ Headquarters by the time the contest begins. Mail or fax the list to CQ, Att: Team Contest, 25 Newbridge Road, Hicksville, NY 11801 U.S.A.; fax 516-681-2926. Awards will be given to the top teams on each mode.

**IV. NUMBER EXCHANGE:** Phone: RS report plus zone (i.e., 5705). CW: RST report plus zone (i.e., 57905).

**V. MULTIPLIER:** Two types of multiplier will be used.

1. A multiplier of one (1) for each different zone contacted on each band.

2. A multiplier of one (1) for each different country contacted on each band.

Stations are permitted to contact their own country and zone for multiplier credit. The CQ Zone Map, DXCC country list, WAE country list, and WAC boundaries are standards. Maritime mobile stations count only for a zone multiplier.

**VI. POINTS:**

1. Contacts between stations on different continents are worth three (3) points.

2. Contacts between stations on the same continent but different countries, one (1) point. *Exception:* For North American stations *only,*

contacts between stations within the North American boundaries count two (2) points.

3. Contacts between stations in the same country are permitted for zone or country multiplier credit but have zero (0) point value.

**VII. SCORING:** All stations: the final score is the result of the total QSO points multiplied by the sum of your zone and country multipliers.

*Example:* 1000 QSO points × 100 multiplier (30 Zones + 70 Countries) = 100,000 (final score).

**VIII. AWARDS:** First-place certificates will be awarded in each category listed under Sec.III in every participating country and in each call area of the United States, Canada, European Russia, Spain, and Japan.

All scores will be published. To be eligible for an award, a Single Operator station must show a minimum of 12 hours of operation. Multi-operator stations must operate a minimum of 24 hours. A single-band log is eligible for a single-band award only. If a log contains more than one band it will be judged as an all-band entry, unless specified otherwise.

In countries or sections where the returns justify, 2nd and 3rd place awards will be made.

All certificates/plaques will be issued to the licensee of the station used.

**IX. TROPHIES AND PLAQUES:**

Plaques and trophies are awarded for top performance in a number of categories. They are sponsored by individuals and organizations. For a current list of plaques and sponsors, or to learn how to become a sponsor, see the CQ website: <http://www.cq-amateur-radio.com/cqwwhome.html>. A station winning a World trophy will not be considered for a sub-area award; the trophy will be awarded to the runner-up in that area.

**X. CLUB COMPETITION:**

1. The club must be a local group and not a national organization.

2. Participation is limited to members operating within a local geographic area defined as within a 275 km radius from center of club area (except for DXpeditions specially organized for operation in the contest; club contributions of DXpedition scores are percentaged to the number of club members on the DXpedition).

3. To be listed, a minimum of 3 logs must be received from a club, and an officer of the club must submit a list of participating members and their scores, both on phone and CW.

**XI. LOG INSTRUCTIONS:**

1. All times must be in GMT.

2. All sent and received exchanges are to be logged.

3. Indicate zone and country multiplier only the FIRST TIME it is worked on each band.

4. Logs must be checked for duplicate contacts, correct QSO points, and multipliers.

5. *We want your electronic log. The Committee* ***requires*** *an electronic log for any possible high-scoring log.*

**E-MAIL Required Content:** *Please submit your log in the Cabrillo file format created by all major logging programs.* Be sure to put the STATION CALLSIGN and the MODE in the "Subject:" line of each message. Your software may automatically encode your log as an attachment. Your e-mail log will automatically be acknowledged by the server. You will also receive a personal access code from the server. Use this code to view your log for completeness and later to retrieve your computer analysis. Submit your CQ WW SSB log to **<ssb@cqww.com>** and your CQ WW CW log to **<cw@cqww.com>**.

**DISKS:** Please send your IBM, MS-DOS compatible computer disk. A disk containing your Cabrillo file may be submitted in lieu of a paper log. Label your disk clearly with YOUR CALL, files included, the mode (SSB or CW), and your category. Name your disk file correctly (for example, HSØAC.log).

6. For paper logs, use a separate sheet for each band.

7. Each paper log entry *must* be accompanied by a summary sheet showing all scoring information, category of competition, and contestant's name and address in BLOCK LETTERS. Electronic submission implies a signed declaration that all contest rules and regulations for amateur radio in the country of operation have been observed.

8. Sample log and summary sheets and zone maps are available from *CQ*. A large, self-addressed envelope with sufficient postage or IRCs must accompany your request. If official forms are not available, make up your own, 80 contacts to the page on 8½" × 11" paper.

9. All paper log entrants are required to submit cross-check sheets (an alphabetical list of calls worked) for each band on which 200 or more QSOs were made.

10. Bad QSO penalty: three (3) additional contacts removed.

11. QRPp and Low Power stations must indicate their category on their summary sheets and state the actual maximum power output used, with a signed declaration.

**XII. DISQUALIFICATION:** Violation of amateur radio regulations in the country of the contestant, or the rules of the contest; unsportsmanlike conduct; taking credit for excessive unverifiable QSOs or unverifiable multipliers will be deemed sufficient cause for disqualification. Incorrectly logged calls will be counted as unverifiable contacts.

An entrant whose log is deemed by the Contest Committee to contain a large number of discrepancies may be disqualified from eligibility for an award, both as a participant operator or station, for one year. If an operator is disqualified a second time within 5 years, he/she will be ineligible for any *CQ* contest awards for 3 years.

The use by an entrant of any non-amateur means such as telephones, telegrams, internet, or the use of packet to SOLICIT contacts during the contest is unsportsmanlike and the entry is subject to disqualification. Action and decisions of the CQ WW Contest Committee are official and final.

**XIII. DEADLINE:**

1. All entries must be postmarked NO LATER than December 1, 2003 for the SSB section and January 15, 2004 for the CW section. **Indicate SSB or CW on the envelope, disk, or e-mail.**

2. An extension of up to one month may be given if requested by letter or other means. The granted extension must be confirmed by letter sent to the attention of the Contest Director, must state a legitimate reason, and the request must be received before the log mailing deadline. Logs postmarked after the extension deadline may be listed in the results but will be declared ineligible for an award.

Both Phone and CW mailed logs should be sent to CQ Magazine, 25 Newbridge Road, Hicksville, NY 11801.


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## What You've Told Us...

Our July survey asked about computers and networking in your homes. In one of the most lopsided responses we've ever seen to a survey question, 93% of the readers who responded report having at least one computer in their homes, and 85% of them have more than one (19% have five or more!). While multiple computers appear to be the norm, networked computers are not, as 65% of those with more than one computer do *not* have them networked. Another 31% has computers linked via a wired network and only 8% report using a wireless network (some of you apparently have more than one type of network). Among the group using wireless networks, more than half (56%) are using 802.11b networks, while 8% are using the older 802.11a and 12% the newer 802.11g standard; 24% aren't sure what kind of wireless network they're using.

Sharing high-speed internet access in the home appears to be the leading reason for networking home computers (28%), followed by sharing files and printers (20%), other (4%) and communication with area hams (3%). The rest (46%) had no network at home.

Multi-user wireless networking does not seem to be high on your priority lists, as 52% said you would not consider such a network at this time, 13% said you'd consider one under unlicensed Part 15 rules, 8% said they'd want to do it under Part 97 amateur rules, and the rest either didn't know or had no opinion.

Finally, you were split on whether you believe that wireless computer networking is a valid amateur radio activity, with 28% saying yes, 29% saying no, and 32% saying they don't know or have no opinion.

This month's free subscription winner is Alex Swedenburg, ABØTJ, of Craig, Colorado.

# Reader Survey September 2003

We'd like to know more about you—about who you are, where you live, what kind(s) of work you do, and of course, what kinds of amateur radio activities you enjoy. Why? To help us serve you better.

Each time we run one of these surveys, we'll ask a few different questions and ask you to indicate your answers by circling numbers on the Survey Card and returning it to us. As a bit of an incentive, we'll pick one respondent each month and give that person a complimentary one-year subscription (or subscription extension) to *CQ*.

At the 2003 World Radiocommunication Conference (WRC-03), the International Telecommunications Union made Morse code exams for hams operating below 30 MHz optional by country instead of mandatory worldwide, began a process to separate broadcasters and hams on 40 meters and loosened up some old international restrictions (see articles in this issue for details). We'd like to hear your views on what should come next.

**Please indicate.... Circle Response Card #**

1. ... whether you agree with the decision at WRC-03 to leave the question of code tests up to each country to decide:
   - Yes ..... 39
   - No ..... 40

2. ... whether you think the FCC should (choose one):
   - Eliminate the code test requirement for all amateur licenses ..... 41
   - Eliminate the code test requirement for General, but keep for Extra ..... 42
   - Replace the current 5 wpm code test with a code recognition test or similar ..... 43
   - Leave the code test requirement as it is ..... 44

3. ... whether you think the FCC should (choose one):
   - Merge the Novice and Technician licenses, combining privileges for both classes ..... 45
   - Expand Technician privileges to include all current Novice HF privileges ..... 46
   - Expand Technician privileges to include only Novice HF voice privileges (28.3–28.5 MHz) ..... 47
   - Expand Technician privileges to include only Novice HF CW privileges ..... 48
   - Expand Technician and Novice privileges to include HF subbands offering voice, CW and data at limited power levels ..... 49
   - Make no change to current Technician or Novice privileges ..... 50

4. ... ... whether you think the FCC should (choose one):
   - Lift restrictions on international third party messages, allowing U.S. hams to pass third-party traffic with any other country that permits it ..... 51
   - Leave current international third party traffic rules in place ..... 52
   - No opinion ..... 53

5. ... whether the ARRL should ask Congress to change the law to allow the FCC to permit operation in the U.S. by any licensed amateur, even if that ham is not a citizen of the country in which he/she is licensed:
   - Yes, as a high priority ..... 54
   - Yes, as a low priority ..... 55
   - No, leave as is ..... 56
   - No opinion ..... 57

6. ... whether you feel the compromise decision on 40 meters at WRC-03 was a worthwhile investment of staff time and member dues by the ARRL and other IARU societies:
   - Yes ..... 58
   - No ..... 59
   - No opinion ..... 60

Thank you for your responses. We'll be back with more questions next month.

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***This rugged VHF HT is built for heavy use and keeps coming back for more.*** Put the power of 5 watts and 40 memories to work for you. The large alphanumeric display makes it easy to manage and the full-size backlit keypad makes field operations easy, with direct frequency input and clearly marked secondary functions. Nothing's held back, with autodial memories, DCS, CTCSS encode+decode, and even a built-in theft alarm!

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BY DAVE INGRAM,* K4TWJ

# HF Mobiling—Real Radio Fun

Continuing with more notes and views on hamming in the great outdoors, this month's column highlights another all-time favorite pursuit among radio amateurs near and far—HF mobiling. Are most of your travels are short, the roads crowded, and you are doing well just to chat with the local gang on 2 meter FM while motoring around town? Think again. Expanding your horizons is easy, and you do not actually have to be in motion to operate mobile. Visualize your vehicle as a handy means of carrying a globe-spanning HF setup everywhere you go. You can enjoy a few minutes of on-the-air time during lunch breaks, while stopped in a mall parking lot, during weekend mini-vacations, and more. Think outside the box . . . err, automobile . . . too. An increasing number of amateurs are operating bicycle mobile and working plenty of DX in the process.

There has never been a better time than right now for HF mobiling. Why? Due to lower sunspot counts and occasional magnetic storms, the number of U.S. amateurs on 20, 17, and 15 meters has dropped, while the number of foreign amateurs has remained high. As a result, QRM is low and contacting foreign lands is easy, even with low power. This is especially true right after a magnetic storm ends. That is when conditions really boom, and nothing compares to the sheer excitement and exhilaration of working DX from the car. Need more encouragement? This month's featured setups, ideas, and goodies should do the trick. Read on!

*4941 Scenic View Drive, Birmingham, AL 35210
e-mail: <k4twj@cq-amateur-radio.com>

## Attention-Grabbing Mobiles

First up is the heart-healthy bicycle mobile setup of Joe Lowe, Jr., W5SAN (photos 1 and 2). Joe is another HF Pack enthusiast like those featured in last month's column, and like many "Packers," he recognizes the advantages of a roll-out-and-operate setup over a multi-box station that has to be assembled and disassembled for each operation.

Joe has three transceivers he uses interchangeably on the bike: an ICOM IC-706 MKIIG, an Alinco DX-70, and a Yaesu FT-817. His on-bike power source is a 12 volt, 7 amp/hour battery mounted directly beneath the seat and held in place with two bungee cords. His antenna is a Hamstick mounted to the bicycle's frame with a clamp-on mirror bracket. The bike's metal frame serves as a ground-simulating counterpoise for the antenna. Joe usually operates "fixed-frequency style" on casual rides and stops to tune or tweak controls when DXing. Needless to say, a bicycle mobile setup like this can be a real treat to use, even if rides are only within a couple of blocks of the home QTH.

Next, Katsu, JE1HJA, shows us how to turn an ultra-compact vehicle such as the little Toyota Echo into the neatest-looking mobile imaginable (photo 3). First he equipped it with a Yaesu FT-100 transceiver, and then he quickly installed a multiband antenna on a trunk-lip mount. Finally, to photograph the Echo he parked it by a lush beach road on Guam in the South Pacific. Now that's what we call mobiling in paradise! Incidentally, Katsu writes about mobiling for the Japanese *CQ* magazine (no relation to this one), and his views—especially those of homebrew "extras" for fun on the road—are always interesting. Hopefully, Katsu will be sharing more views with us in the future. Watch for them.

Remember Bob Heil's classy little KWM-1 transceiver-equipped 1956 Thunderbird featured on the cover of the May 2003 issue of *CQ*? It was an absolute heartthrob for sure, but check out his new mobile mar-

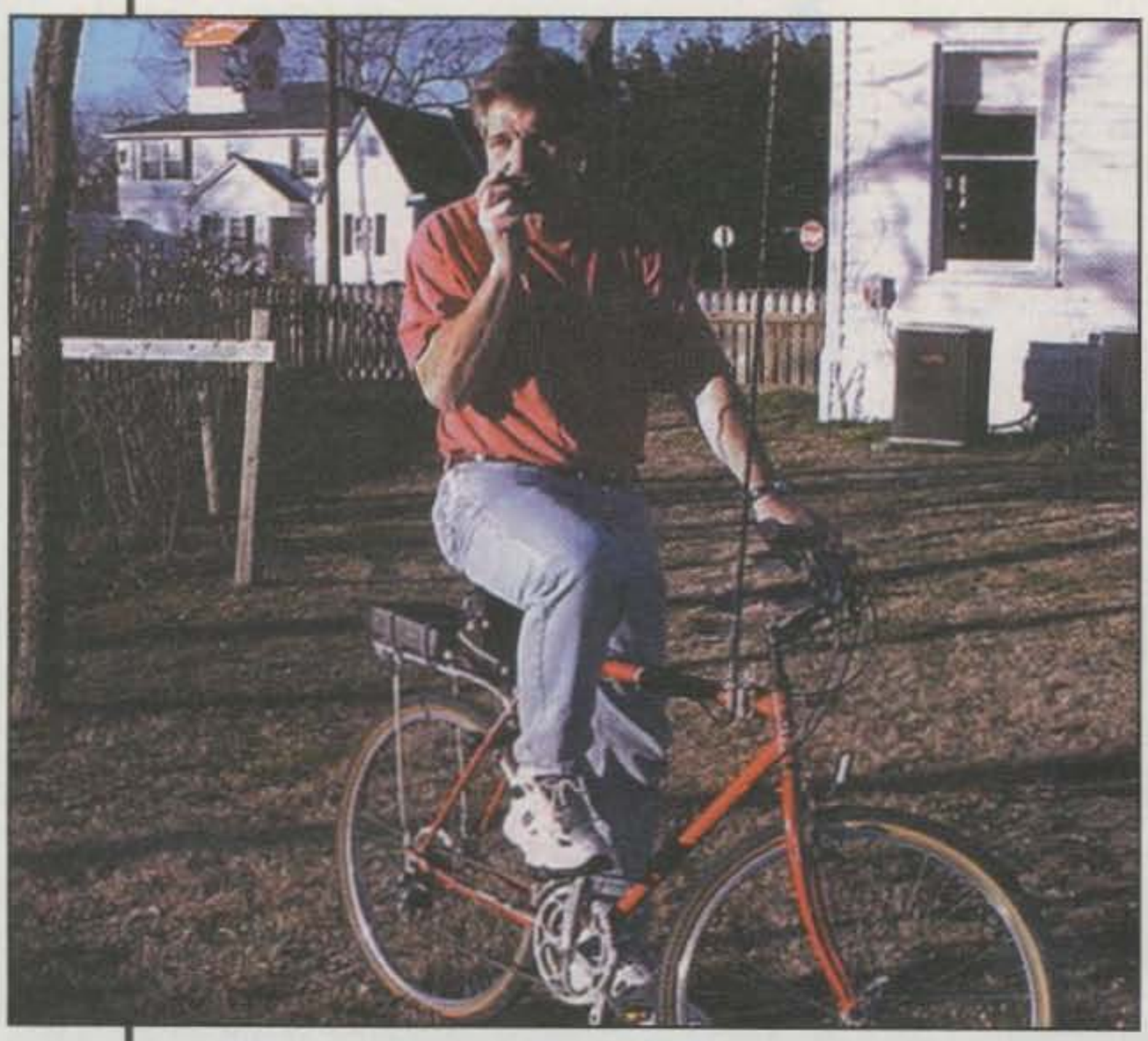

*Photo 1– As HF Pack enthusiast Joe Lowe, Jr., W5SAN, shows us here, mobiling need not be limited to cars—and there are no problems with ignition noise when running bicycle mobile. Joe "turned things around" by mounting the antenna on the bike's front and strapping the rig behind the seat. He usually operates on fixed HF Pack frequencies, so the arrangement works out fine. (Photo courtesy W5SAN)*

*Photo 2– Close-up view of mic clip and antenna mount on the W5SAN/bike-mobile setup. Mirror bracket has an SO-239 to 3/8-24 thread fitting with a PL-259 on a cable from the rig and a quick disconnect on the Hamstick antenna. For serious biking, Joe wears a headset with boom mic.*



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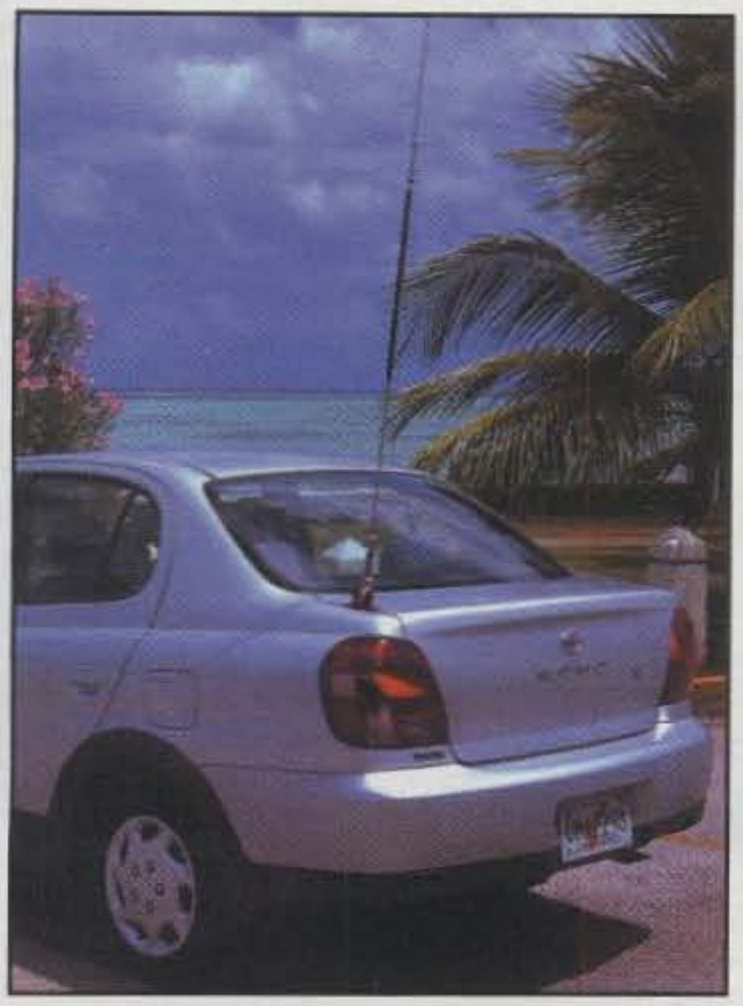

*Photo 3– Some ultra-compact vehicles are boring and dull, but Katsu, JE1HJA, really jazzed up this one with a cool trunk-lid-mounted HF antenna and lush South Pacific setting on Guam. The little vehicle was so attractive that it graced the front and rear covers of a recent issue of Japanese CQ. It sort of inspires you to go fun mobile in a Toyota Echo, doesn't it? (Photo courtesy JE1HJA and CQ magazine of Japan)*

vel in photos 4 and 5. This one is ready for some serious on and off the road mobiling with a *big* High Sierra "screwdriver" antenna, Kenwood TS-2000, and several test versions of world-famous Heil mics. Although it's just a rumor, I hear the '56 T-Bird is also packed in the back of the Hummer for safekeeping and local runs. The real kickers separating this Hummer from others, however, are the logos. They are found on the sides, back, and hood. Total class for sure!

## New Mobile Antennas

Maldol, the folks who make neat 2 meter and 70 cm mobile antennas, has recently announced a new multiband mobile antenna that promises to be a real crowd pleaser for HF as well as VHF/UHF mobiling (photo 9). The new antenna is the HMC-6S. It's lightweight, stands 68 inches tall from base to tip, and covers 70 cm, 2 and 6 meters, plus 10, 15, and 20 meters, with 40 meters available by adding an optional coil. Additional coils for 80, 30, and 17 meters should soon be available as options.

Various band coils (and their included stingers) mount vertically beside the main radiator, producing a trim, low-profile appearance. That's quite a change from the popular screwdriver- and BugCatcher-type antennas, but it opens up some interesting mounting options for otherwise "impossible" situations. It can be mounted on a car's trunk lid (the most popular arrangement) or on a below-bumper-frame extension strap for slipping under low overhangs. Garaging is no problem in either case, as the antenna's base (which is fitted with a PL-259 connector) has an integral fold-over feature. Using a Comet RS-730 or similar trunk-lip mount with SO-239 socket/base makes installation a cinch.

More details on both Maldol and Comet products (including more antennas!) are available from importer/distributor NCG (<http://www.natcommgroup.com/index.php> or 1-800-962-2611) or your favorite Comet dealer.

One Comet dealer is VIS (<http://www.visradio.com> or 1-800-655-4267), where you can also check out their new palm-size LED flashlights such as those shown in photo 10. They have a nightlight (or "glow") mode, low- and high-intensity modes with finely focused beams to really scrutinize dim corners, and a flashing/strobe mode for emergency road use. They operate from regular 9 volt batteries and typically shine for 200 hours on low, 20 hours on high, or 7 days on strobe.

Do you want to pump out a really big mobile signal while parked for the evening? MFJ Enterprises has a couple of extra tall, lightweight whips or "super stingers" and a manually adjustable screw-


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|---|---|---|---|
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| OB2-40 | 2 | 40 | 18 feet |
| OB2-40m (Moxon) | 2 | 40 | 18 feet |
| OB8-4M (Moxon) | 8 | 40-20-15-10 | 20 feet |
| OB12-4 | 12 | 40-20-15-10 | 25 feet |
| OB21-4 | 21 | 40-20-15-10 | 38 feet |
| OB12-6 | 12 | 40-20-17-15-12-10 | 22 feet |
| OB6-3M (Moxon) | 6 | 20-15-10 | 10 feet |
| OB7-3 | 7 | 20-15-10 | 14 feet |
| OB11-3 | 11 | 20-15-10 | 20 feet |
| OB16-3 | 16 | 20-15-10 | 33 feet |
| OB9-5 | 9 | 20-17-15-12-10 | 17 feet |
| OB4-2W | 4 | 17-12 | 12 feet |
| OB7-2W | 7 | 17-12 | 17 feet |
| OB9-2W | 9 | 17-12 | 33 feet |

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*Photo 4– If you missed this big attention grabber at Dayton 2003, it is audio master Bob Heil's new Ham Hummer. Go for the gusto, Bob! (Photo courtesy proud owner K9EID)*

*Photo 5– A BIG High Sierra antenna, a cool rig, and a super-sounding Heil mic set Heil's Ham Hummer apart from dull "look alikes." (K9EID photo)*

*Photo 6– Paul Varney, NT8S, added an interesting twist . . . err, lever . . . to his pickup mobile. The multiband Hustler is supported by a swiveling marine antenna mount with home-brewed locking lever positioned right behind the cab. One pull and the whip folds back across the bed for easy garaging. Clever! Do you have questions? Send a messageto <varney@hccanet.org>.*

*Photo 7– In-cab view of the NT8S mobile setup. Paul mounted the IC-706 remote head in front of the instrument cluster so he can see it while driving or look over and past it to see RPMs below 1000 or speeds lower than 18 mph. The main body of the IC-706 is behind the seat for security reasons.*

driver antenna. The whips are retractable jobs that extend to 10 and 12 feet (a full quarterwave on 10, 12, and 15 meters!) and collapse down to 20 inches for carrying under a seat while traveling. A $4\frac{1}{2}$ foot retractable whip is also available for our more conservative-minded friends. All three whips are fitted with a $\frac{3}{8}$-24 thread base to mate with regular antenna mounts, hardware, and coils. This allows for exceptional flexibility in homebrewing mobile antennas that store in minuscule space when you are moving, yet screw together in a flash and work like a champ when you are stopped (photo 11).

Final details on the new MFJ manual screwdriver antenna were still being worked out as I wrote this month's column. Essentially, it consists of a heavy-duty, 2 or 3 foot bottom section with an adjustable 1.5 inch diameter, 7 inch long coil with a $\frac{3}{8}$-24 thread fitting at the top for a stinger. You set it for operation on 40 through 10 meters by sliding part of the coil upward to expose a required number of turns for resonance, and then secure it in place with the coil's locking nut. Since the coil has a $\frac{3}{8}$-24 top fitting, you can add a stinger of any length or height desired. Cool!

There are two quick-and-easy ways to tune this antenna. One is by listening for a peak in band noise while moving the coil up or down a couple of turns at a time, then fine-tuning the adjustment while watching your rig's SWR meter/ function. The second method is even easier. Just plug the cable that normally routes to your mobile transceiver into an MFJ-259B Antenna Analyzer, read the frequency of lowest SWR on the display, and move the coil up or down until you attain the lowest SWR for your chosen frequency. Then plug the cable into your rig and have a ball!

MFJ goodies are available from amateur radio dealers nationwide or directly from MFJ at 1-800-647-1800 or <http://www.mfjenterprises.com>.

## New "Screwdriver" and Controller

Vern Wright, W6MMA, just keeps on pumping out new versions of his "Super Antennas" and support items, and his recently introduced MP3, shown in photo 12, is some of his latest work. This servo-motor-tuned antenna is quite trim and classy, covers 40 through 6 meters, and fits on a regular trunk-lip mount. It typically stands around $5\frac{1}{2}$ feet tall, but different-length top stingers can be substituted to vary its overall height. Vern even produces 1 foot and 2 foot lower mast sections to fit the antenna if you prefer center (well, near center) rather than base loading. He also has a new "do it all" controller for the MP3 (and all other screwdriver-type antennas), the SDC120.

The new controller has a built-in SWR sensor/monitor with LEDs, a frequency counter, and a memory function. You can tune it manually or connect it to a Kenwood, ICOM, or Yaesu mobile transceiver with an external antenna tuner function. You

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AL-811
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**Only** the Ameritron AL-811H gives you four *fully neutralized* 811A transmitting tubes. You get absolute stability and superb performance on higher bands that can't be matched by un-neutralized tubes.

**Ameritron** mounts the 811A tubes vertically -- not horizontally -- to prevent hot tube elements from sagging and shorting out. Others, using *potentially damaging horizontal mounting*, require special 811A tubes to retard sagging and shorting.

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**AL-811** has three 811A tubes and gives 600 Watts ouptut for only $649.

## Near Legal Limit ™ Amplifier

AL-572
**$1395**
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**New** class of *Near Legal Limit*™ amplifier gives you 1300 Watt PEP SSB power output for *65%* of price of a full legal limit amp! Four rugged *Svetlana* Russian 572B tubes. Instant 3-second warm-up, plugs into 120 VAC. Compact 8½Hx 15½Dx14½W in. 160-15 Meters. 1000 Watt CW output. Tuned input, instantaneous RF Bias, dynamic ALC, parasitic killer, inrush protection, two lighted cross-needle meters, multi-voltage transformer.

## HF Linears with Eimac 3CX800A7

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Two tubes, 1500 W plus

AL-800
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Single tube, 1250 Watts

**These** HF linears with *Eimac*® 3CX800A7 tubes cover 160-15 Meters including WARC bands. Adjustable slug tuned input circuit, grid protection, front panel ALC control, vernier reduction drives, heavy duty 32 lb. grain oriented silicone steel core transformer and high capacitance computer grade filter capacitors. Multi-voltage operation, dual illuminated cross-needle meters.

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**Ameritron's** AL-80B kilowatt output desktop linear amplifier can double your average SSB power output with high level RF processing

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**You** get cooler operation because the AL-80B's exclusive *Instantaneous RF Bias*™ completely turns off the 3-500ZG tube between words and dots and dashes. It saves hundreds of watts wasted as heat for cooler operation and longer component life.

**You** get a full kilowatt PEP output from a whisper quiet desktop linear. It's a compact 8½Hx14Dx15½ inches and plugs into your nearest 120 VAC outlet. Covers 160 to 15 Meters, including WARC and MARS (user modified for 10/12 Meters with license).

**You** get 850 Watts output on CW, 500 Watts output on RTTY, an extra heavy duty power supply, genuine *CLASSIC*® 3-500ZG tube, nearly 70% efficiency, tuned input, Pi/Pi-L output, inrush current protection, multi-voltage transformer, dual Cross-Needle meters, QSK compatability, two-year warranty, plus much, much more! **Made in the U.S.A.**

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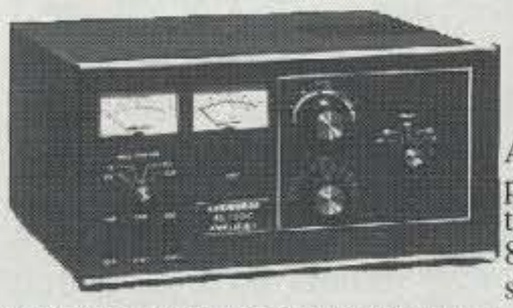

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### Ameritron's 3CX1200A7 linear Amp

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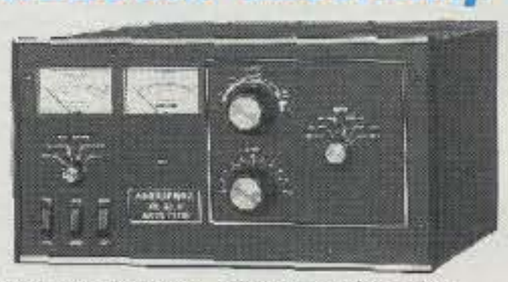

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**No** tuning, no fuss, no worries -- just turn it on and operate. Includes AC power supply, 600 Watts output, continuous 1.5 to 22 MHz coverage, instant bandswitching, fully SWR protected, extremely quiet, very compact. Amp is 6x9½x12 inches.

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Oil cooled 50 Ohm dummy load handles 1500 Watts for 5 minutes. SWR under 1.2 up to 30 MHz. Low SWR to 400 MHz.

***ICP-120/240 Inrush Current Protector . . . $79***

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***ATR-20 1.2 kW SSB Antenna Tuner . . . $459***

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Protects your costly transceiver from damage by keying line transients, steady state current and excessive voltages.

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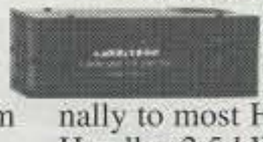

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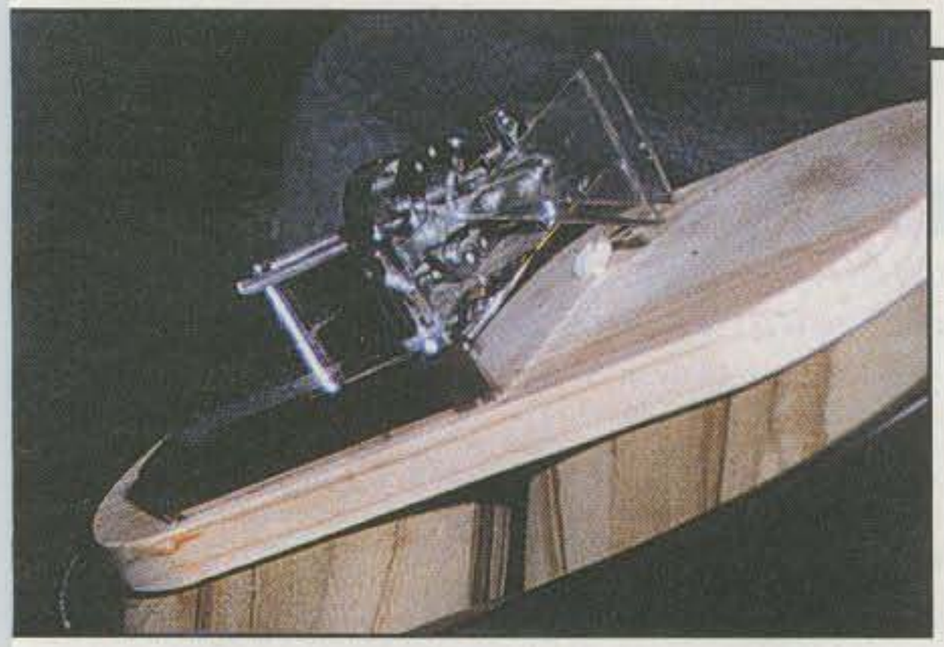

*Photo 8– For mobile CW, Paul mounted a paddle to a wooden base attached to two pieces of wood turned in a lathe and cut at an angle. The adapter (which was painted to match the interior after photographing) fits in the pickup's between-seat cup holders. (Photo courtesy NT8S)*

just tap "tune," and the controller activates the MP3 motor, finds a low SWR, and stores the band/ frequency for instant recall when you return to that band segment in the future. For details, take a look at <http://www.superantennas.com> or call Vern at 530-662-6668. Also ask about the W6MMA portable multiband beam, collapsible mast, and drive-on antenna mount. They are awesome, too!

## Conclusion

Once again we have overflowed available space and must make a quick exit. There are just more exciting things happening in amateur radio today than we can squeeze into these monthly columns! It's great! If you are not on the air and active, friends, you are missing a treat. Flip on that rig and join the fun!

73, Dave, K4TWJ

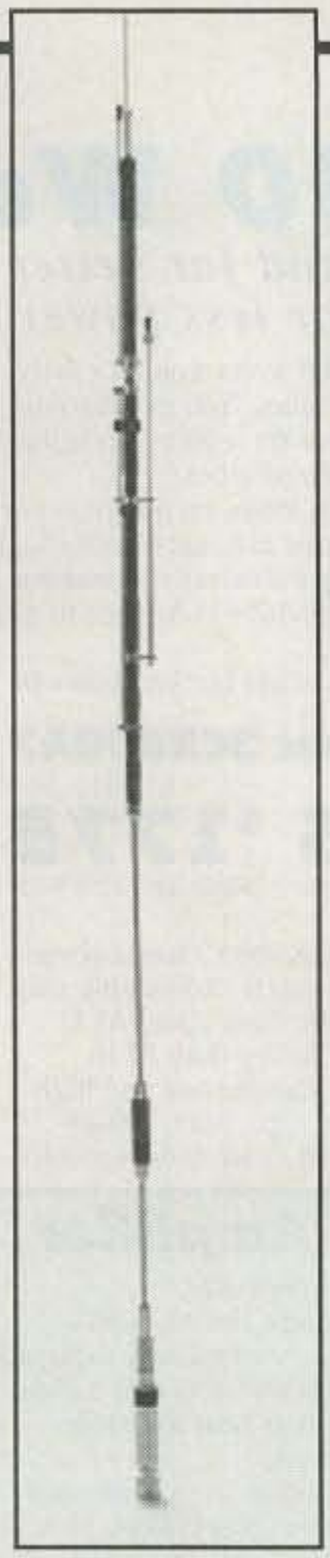

*Photo 9– Maldol's new HMC-6S HF/VHF mobile antenna features parallel-connected radiators for instant band changing, and each is adjustable for lowest SWR in preferred frequency ranges. It is trim, compact, and available from dealers nationwide. (Details in text.)*

*Photo 10– VIS Radio always has some unique goodies for mobiling and more, and this pocket-size LED flashlight is a shining example. It glows like a nightlight, flashes like a strobe, and includes a high-intensity beam that is BRIGHT! (See details in text.)* ↓

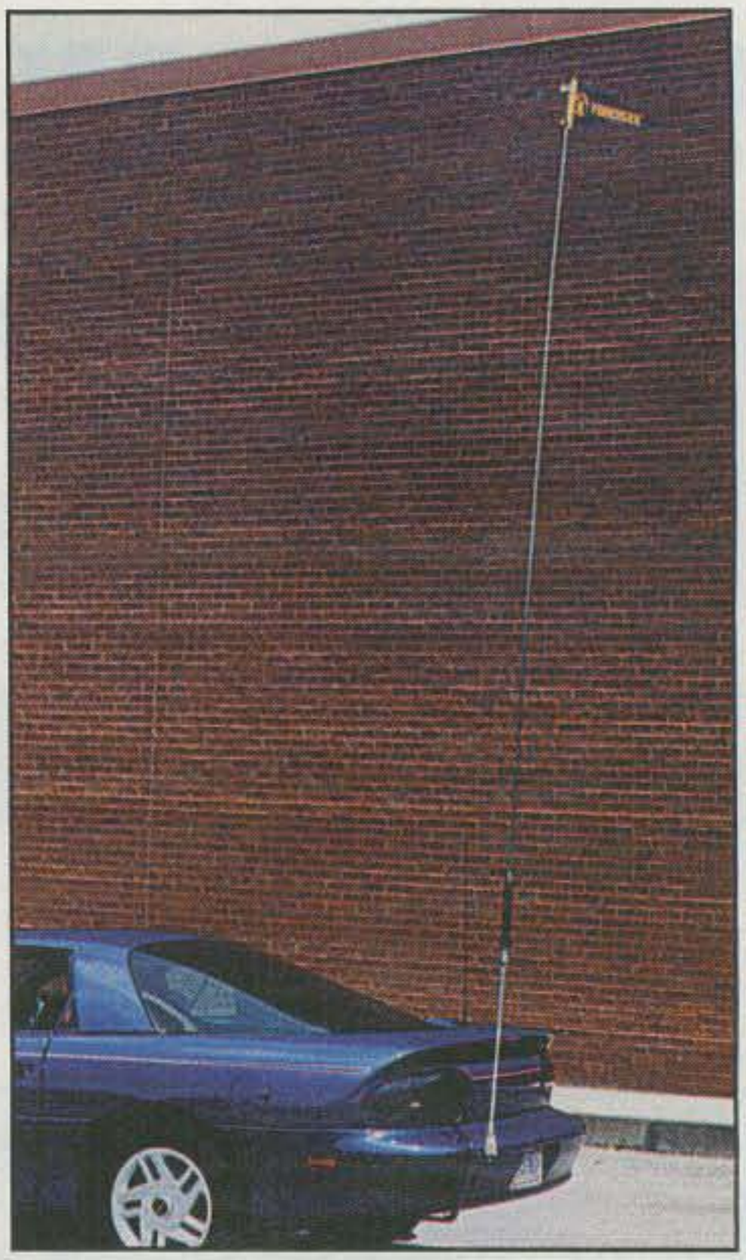

*Photo 11– Tired of getting "walked on" in pile-ups while mobile? Add a new MFJ 10- or 12-foot tall whip/stinger to your screwdriver- or Bugcatcher-style antenna while parked (only!) and pump out a killer signal. If they can't hear you with this "Tall Tenna," give up! Note the Vibroplex flag atop the whip/stinger.*

*Photo 12– The new W6MMA MP3 servo-motor-driven "Super Antenna" rides on a regular trunk-lid mount, covers 40 through 6 meters, and has a weatherproof cover. When mated with optional SDC-120 controller, the antenna changes bands and tunes right in step with your mobile transceiver. (Photo courtesy W6MMA)*


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| MODEL | CONT. (Amps) | ICS | SIZE (inches) | Wt.(lbs.) |
|---|---|---|---|---|
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MODEL SRM-30M-2

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| SRM-30-2 | 25 | 30 | 3½ x 19 x 9⅜ | 11.0 |

**WITH SEPARATE VOLT & AMP METERS**

| MODEL | CONT. (Amps) | ICS | SIZE (inches) | Wt.(lbs.) |
|---|---|---|---|---|
| SRM-25M-2 | 20 | 25 | 3½ x 19 x 9⅜ | 10.5 |
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BY WAYNE YOSHIDA,* KH6WZ

# A Look at Homebrewing

My interest in ham radio was sparked by my interest in building electronic gadgets. Actually, my interest may have been initiated even earlier, since my parents often told me that when I was a kid, I spent most of my time *behind* the TV set, rather than in front of it. When I was in elementary school, one of my teachers, Ms. Leary, let us do experiments with electricity using a dry cell, doorbells, buzzers, and switches. The switches were made of wood blocks, strips of tin can, and thumbtacks. We had a lot of fun.

I remember reading the "Carl and Jerry" adventures in old issues of *Popular Electronics*. I built simple, "do nothing" projects such as blinking neon-light displays and "color organs." However, this quickly got old and boring. I wanted to make an electronic project that did something *useful* and *interesting*. I built a code practice oscillator and studied the Morse code. Then in high school, with the help of a very generous mentor, Bob Miles, WA6LLW (now N7LL), I got my Novice license.

Building your own stuff, what we call "homebrewing," is still an important part of ham radio. Last month we looked at some of the basic tools you need to build your own electronic gadgets. This month we'll look at some things you can do with them.

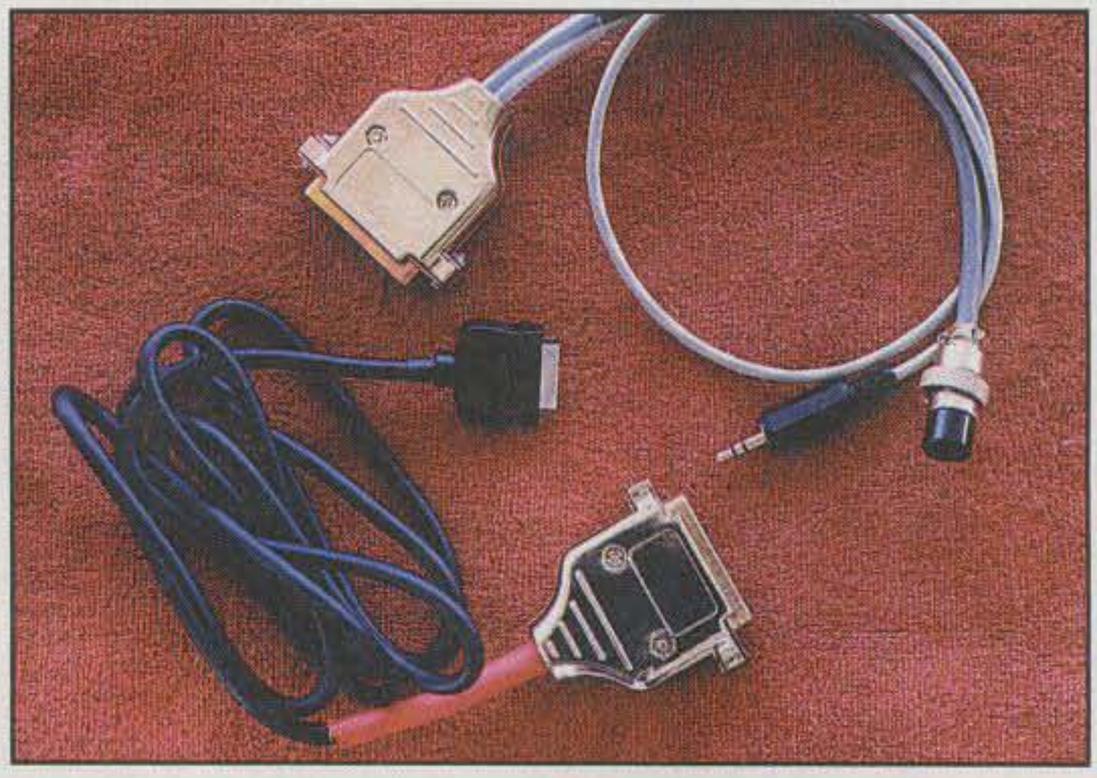

*Photo A– These home-built cables increase equipment versatility. At the upper right is a cable to interface a mobile rig to a TNC, and the cable at the lower left makes a Yaesu radio compatible with a Kenwood accessory.*

## What is a "Homebrew" Project?

These days homebrewing can take on several different meanings. Back in my day, some of us made our equipment using "spare" parts from old TV sets and wound inductors (coils) around toilet-paper tubes. If you are curious about these types of projects, check out the "Radio Classics" and the "World of Ideas" columns in *CQ*.

Homebrewing can be looked at in several very practical ways. First, it is fun. Second, it can save you some money. Third, you may be looking for a certain gadget or accessory that does something you want, but is simply not an "off-the-shelf" item, and so you must resort to "rolling your own." A good example of this is my set of "universal-ized cables" which interface different accessories to different radio brands (photo A).

Antennas can also be homebrewed (a whole topic in itself). Many articles and books cover antenna theory and construction. Take a look at the items in the CQ Bookstore as well as the publication ads from the ARRL for good antenna books.

The most ambitious homebrewed project is the full-on, build-it-from-scratch-from-nothing project. You design from the ground up, all on your own. I must confess, I haven't done this in a very long time, and it can be very difficult. However, the level of difficulty also contributes to the amount of enjoyment you will get from such an undertaking. For the rest of us, though, the kit and the "made from a magazine article" project will be challenging enough.

## Beyond "Batteries Not Included"—The Kit

There are very useful electronic projects available for your station in kit form. Unfortunately, the legendary Heathkit products with their incredible and well-organized manuals are long gone. These days a "kit" often refers to an envelope of loose parts, sometimes (but not always) an etched printed circuit board (PCB), and a set of instructions. Sometimes there are many parts intentionally missing (to let the builder customize), or they are available at extra cost. These include cabinets, a power supply, and hardware items such as switches, connectors, and screws and nuts. On the other hand, some kit manufacturers take particular pride in making sure their kits include absolutely everything you'll need. Be sure you know what you are getting (and what else may be needed) before you order a project "kit."

Recently, I built a Ramsey Electronics LABC-1 lead-acid battery charger for my collection of gel-cells that I use to power my VHF and UHF gear. The Ramsey kit includes all loose parts, a PCB, and a set of instructions (photo B). The case is optional, and you need a power transformer (at extra cost) to complete the unit. I had to trim the PCB to fit the aluminum case I had in the junk box (see below). I used a toggle switch for power on/off instead of the push-on, push-off switch and a green LED instead of the supplied red LED for

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*Photo B– This kit comes with all small parts and a PC board. A cabinet and power transformer are optional, but necessary, accessory items sold separately.*

*Photo C– The completed KH6WZ-customized Ramsey Electronics lead-acid battery charger. I used an aluminum chassis box I had in the junk box. I added a green LED for "Trickle/Ready" and heavy-duty binding posts and replaced the power switch.*

"trickle/ready" (photo C). The unused parts went into the junk box for possible use in another project some day.

## The "Made from a Magazine Article" Project

Perhaps the best part of homebrewing is the ability to customize the project just for your application or needs. You can enclose your project in a special cabinet, either bought or homemade.

I built the "Simple Meter Tester" from an article in *QST*.[1] I assembled it in a plastic electrical box (69 cents) and attached a cell-phone belt clip on the box for portability (photo D). I always take it with me to radio swap meets or when I visit the electronics surplus store. For example, I recently came across a whole box of small panel meters for $4 each, but there wasn't any information on what the meter movement ratings were. A quick check with the "Simple Meter Tester" confirmed that the meters were zero to one milliamp units, a very useful range.

Photo E shows a "reverse polarity protector" experiment I recently built from another magazine article. If you look closely at the photo, you'll see that I used something called the "solderless breadboard." The importance of soldering was discussed in the "Beginner's Corner" column for May 2003. There can never be enough emphasis on being able to solder well. That said, the solderless breadboard is useful for experimenting, because you can use and reuse parts several times over. It's very much like a giant socket in which parts and wires plug in and unplug without making permanent or "semi-permanent" soldered connections. Be careful, though. This construction technique is probably not going to work on high-frequency or high-gain circuits. However, for a lot of digital and simple analog circuits,such as power-supply projects, you can plug and unplug to your heart's content.

## Using Models: Commercial Gear and Professional Installations

As you get into making stuff, take a close look at the guts of commercially made electronics products such as test instruments, radios, and so forth. Custom car audio installations are also good for inspiration. Open the cabinet (making sure the gadget is turned off and unplugged first) and examine how things are done so that when you build something, you can make it look like a store-bought unit.

Notice, for example, how the color-coded bands on resistors all are going one way, usually left-to-right or top-to-bottom, with respect to one side of the chassis. Also check the use of tie points, cable harnesses, and the arrangement of wires within the cabinet. This is called *lead dress.* A radio technician showed me a very useful technique he uses to dress wires: use a heat gun to soften the insulation a little bit, route the wires nicely, and hold them in place until the wires "harden up." This will make the wires hold their shape and stay in place.

## Talk to People

Recently, on a trip to my favorite electronics parts place I ran into someone at the register who had a gad-zillion terminal strips, connectors, and various other parts. I said something like, "Boy, I'm glad to see I'm not the only one who buys a whole bunch of tiny parts here. What-cha makin'?"

It turns out that the fellow used to work for an electronic tube company and ran into a lot of hams over there, so he wasn't lost when I told him about my project. Anyway, we started to talk about what he was about to build, and it turns out that he has a business making custom guitar amplifiers. His

*Photo D– I built this meter checker from an article in* QST, *but used a 69 cent cabinet and added a handy belt clip.*

[1]*See references at end of article.*

name is Peter Belov and he turns guitar amplifiers into works of art. See <www.belovamps.com> for some inspiration on how to make an electronic device look beautiful.

One exception to the "look nice" approach to wiring is when you are dealing with RF and maybe audio circuits. In this case it is best to make all leads as short as possible to avoid instability or to ensure proper operation. The so-called "ugly" construction is sometimes used. See the "Circuit Construction" chapter in *The ARRL Handbook* for some guidance here.

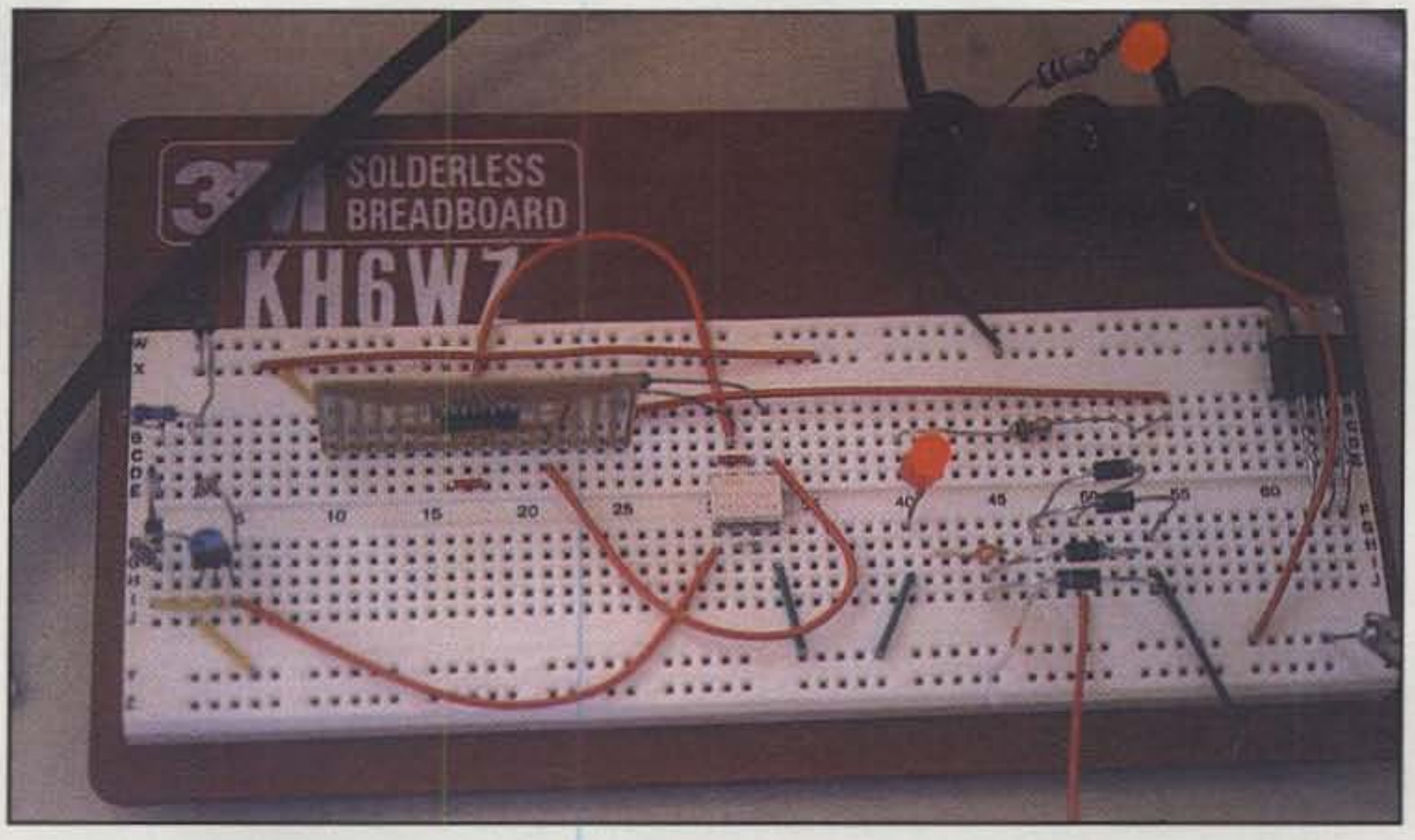


*Photo E– Soldering is vitally important. However, a solderless breadboard is very useful to verify a circuit design. Here I am experimenting with a reverse-polarity protection circuit. Parts can be reused for other projects.*

## The Junk Box

When speaking to hams who build or modify anything, often you will come across the term *junk box,* used to describe a collection of spare parts that may be useful in an upcoming project. The parts don't need to have an immediate use; they just need to be saved. I've seen this phenomenon with other pursuits, such as woodworking and auto mechanics. If your significant other sews, ask her if she has a collection of bobbins, buttons, snaps, and thimbles. If so, then she has a junk box, too, although you may want to use that term very carefully with her.

Interestingly, I don't think most hams consciously set out to "make" a junk box. They "just happen." I have a collection of spare fuses, metric screws and nuts, switches, LEDs, and other electronic things, but I have no idea where a lot of those parts came from. However, I am sure that they will be useful in some project some day, so I save them in little plastic jars, boxes, and even plastic bags.

Having a well-stocked junk box can save you time and money. For example, a new project may require a miniature 10K ohm potentiometer (pot, or variable resistor) and knob, so you dig around in your junk box and come across a pot that you salvaged from a defunct stereo a few years ago (saving money). You were thoughtful enough to save the knob, too (saving money again). Now you won't have to make a trip to the electronic parts store or order something on-line or over the phone (saving time). Think of your junk box as an investment with lots of liquidity; the parts are all there just waiting to be put to good use. You might even be able to trade something in your junk box for something in someone else's junk box for a project. This is another element of what homebrewing is all about.

## Your Turn...

Have you built anything lately? Did you attempt to build something and were you successful? If so, great. Tell me about it. If something went wrong, tell me about that, too, and how you fixed it. My e-mail address is <kh6wz@cq-amateur-radio.com>. Take a good photo or two of your projects—either regular color prints or high-resolution digital—and describe what they are and what they do. I'll try to mention the best ones in this column.

73, Wayne, KH6WZ

### References

"A Simple Meter Tester," *QST*, March 2000, p. 4.

"Hints & Kinks," *QST*, June 2002, p. 62 (a neat trick for making front panels).

"Polarity protector outperforms Schottky diodes," *EDN* magazine, February 6, 2003, p. 86. Also online at <www.e-insite.net/ednmag>; search for Polarity Protector.

Ramsey Electronics LABC-1 Lead-Acid Battery Charger, see <http://www.ramseyelectronics.com>.

*The ARRL Handbook for Radio Communications*, ARRL, Newington, CT, ISBN 0-87259-189-1.

*Ham Radio Anthology: Homebrewing Techniques*, CQ Communications, Hicksville, NY, ISBN 0-943016-25-8.

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BY KENT BRITAIN,* WA5VJB

# Trap Antenna Basics

*We welcome Kent Britain, WA5VJB, as our new Antennas Editor as of this issue, succeeding Arnie Coro, CO2KK. Arnie's other time commitments prevented him from continuing to do a regularly scheduled column. CO2KK will remain a CQ Contributing Editor at Large and we will look forward to sharing his articles with you when his schedule gives him time to write.*

*WA5VJB has been part of the CQ "family" since 1995, writing about antennas for CQ VHF, the now-defunct CB Radio magazine, and Popular Communications. We welcome him to the pages of CQ as well.* —*W2VU*

I have been writing antenna construction articles for three of CQ Communications' other magazines for eight years. At Dayton this year, Rich, W2VU, caught up with me and invited me to write for the big one. Perhaps you could characterize his recruiting technique as being much like the way the British press gangs Shanghai'd sailors, but we'll have fun and cover a wide variety of antenna topics, starting, perhaps appropriately, with "trap" antennas.

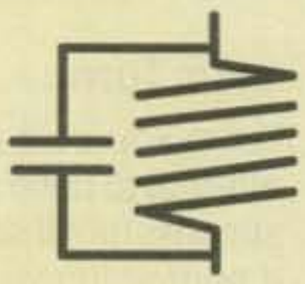

*Fig. 1– A parallel tuned circuit, consisting of a coil and a capacitor, is one of the most basic electronic circuits.*

It all starts with the parallel tuned circuit (fig. 1), which is a basic circuit of electronics. At resonance, the parallel tuned circuit has a very high impedance, meaning it is very hard to make a signal on the resonant frequency go through the circuit. As an example, let's say we make a tuned circuit tuned to a local AM radio station at 1000 kHz (fig. 2, Circuit A) and a parallel tuned circuit tuned to the same frequency (fig. 2, Circuit B). In the first circuit every signal coming down the antenna goes straight to ground, except the signal for which the parallel tuned circuit is tuned. Since the 1000 kHz signal can't go through the coil, it goes through the diode and earphone instead. Bingo. We have a crystal radio.

However, let's say the 50,000 watt transmitter for that station is just down the road and it's wreaking havoc on the front end of your HF rig. Now we can take advantage of the blocking effect of a parallel tuned circuit and use the tuned circuit (shown in fig. 2, Circuit B) to allow every frequency *but* 1000 kHz into our HF rig.

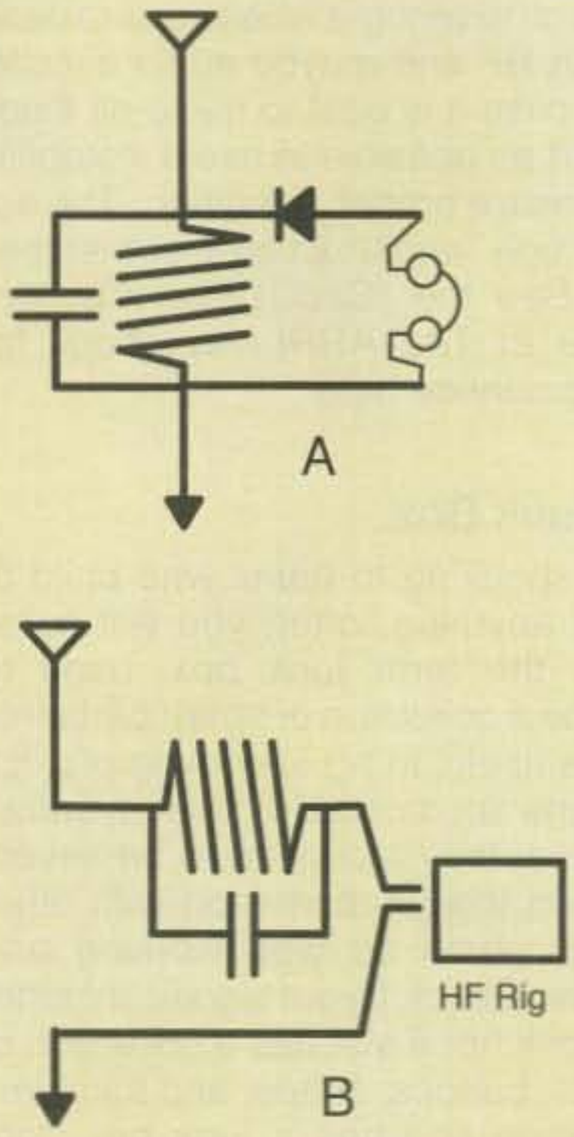


*Fig. 2– Circuit A shows how a tuned circuit in a crystal set sends most signals to ground and signals on the selected frequency to the diode and headphones. Circuit B puts a similar circuit to work between an antenna and an HF rig. (See text for details.)*

I'm going to over-simplify a bit here, but when a parallel tuned circuit is tuned to, say, 1000 kHz, it looks like an inductor to signals below 1000 kHz and looks more like a capacitor to signals above 1000 kHz. It's that property of looking like an inductor below resonance that we want to use in our trap vertical antenna.

Ahhh . . . but how much inductance? There are thousands of combinations of inductance and capacitance that will result in a parallel tuned circuit at HF (some would say an infinite number, but let's not waste our time with changes that don't move an antenna's resonant frequency even 1 Hz!). As you can see in fig. 3, I can make the trap heavy on the inductance side or heavy on the capacitance side, depending on how I plan to tackle the next step.

## Building a Trap Vertical

Let's see how a triband (10/15/20 meter) trap vertical goes together. We start out at the bottom with a quarter-wave vertical for 28 MHz and a parallel tuned circuit for 28 MHz (fig. 4). When I mount the tuned circuit on the top of the vertical, not much happens. The 28 MHz signal can't pass through

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e-mail: <wa5vjb@cq-amateur-radio.com>

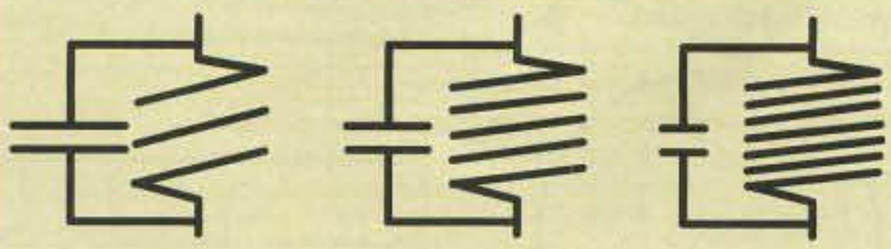


*Fig. 3– Different combinations of inductance and capacitance vary the resonant frequency of the tuned circuit and the length of the straight element that will be needed for the next band segment.*

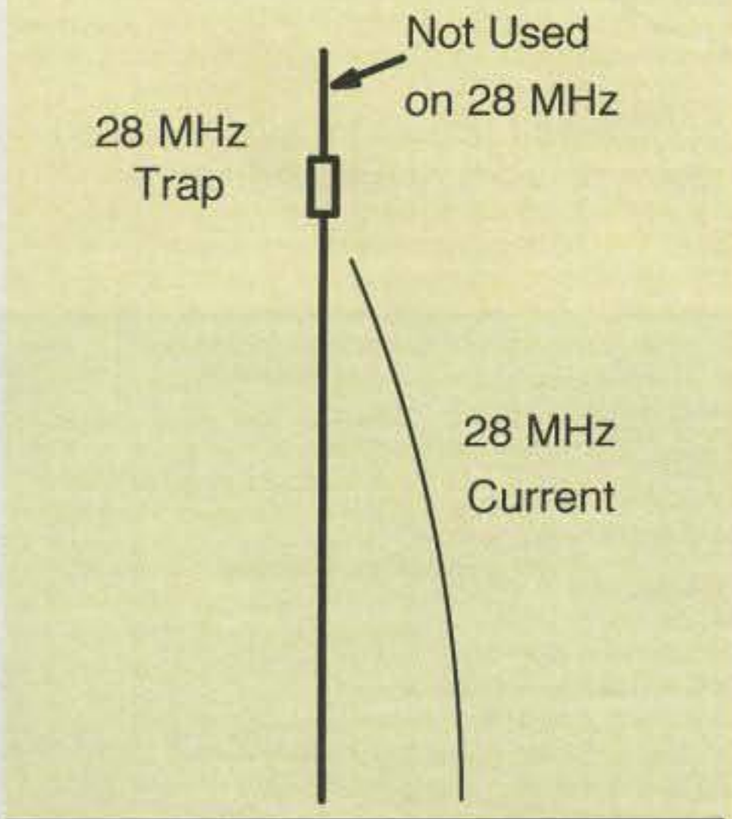



*Fig. 4– On a trap-topped 28 MHz vertical, a 10 meter signal "sees" the trap as the end of the antenna.*

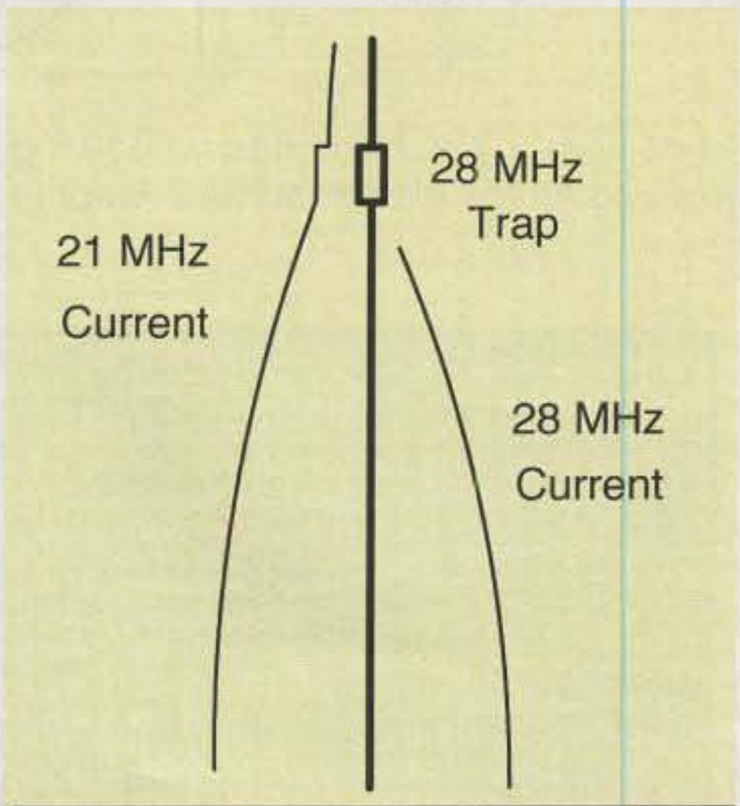



*Fig. 5_ A 21 MHz signal sees the coil as an inductor and passes easily through it to the end of the 21 MHz section.*

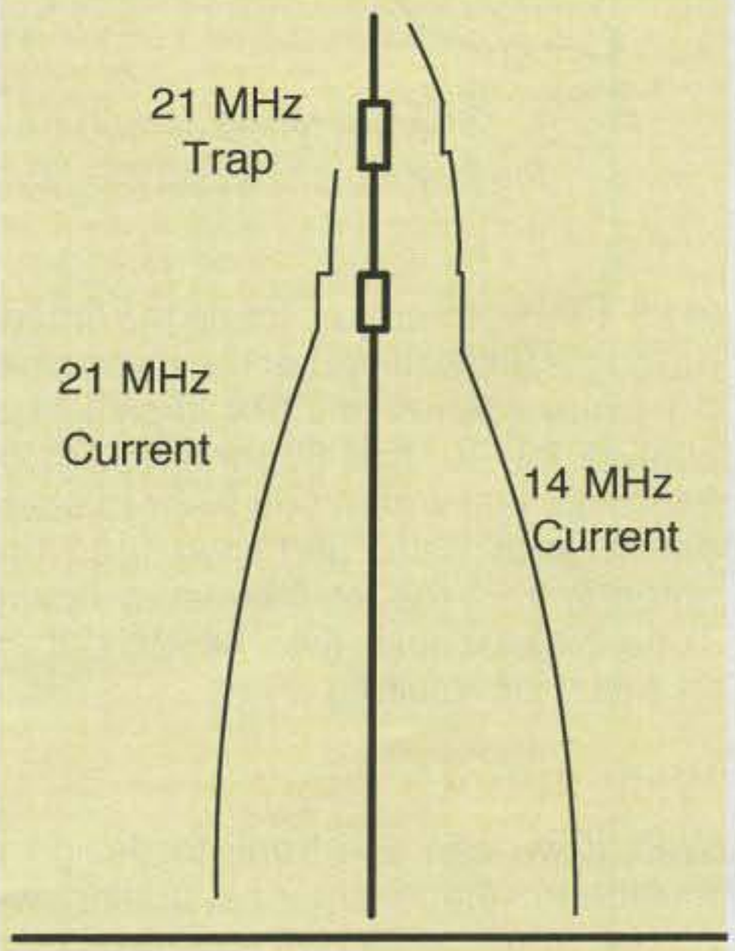



*Fig. 6– Going a step beyond fig. 5, we now have a 14 MHz vertical with two traps, producing a single antenna that is resonant on 20, 15, and 10 meters.*

the tuned circuit, and the wave is "trapped" in that section of the antenna. Any aluminum above the 28 MHz trap is invisible to the 28 MHz signals. As far as those signals are concerned, the antenna ends at the trap. However, for a signal at 21 MHz, that 28 MHz trap looks like an inductor and we can take advantage of that in the next step.

The trap is now a loading coil for the 15 meter vertical, and I have a vertical that works on both 10 and 15 meters with one feed (fig. 5). Here is where a lot of design considerations come into play. I can design my trap with a lot of inductance, and the antenna above the trap is short. Less inductance and more capacitance, and the antenna above the trap is longer. Of course longer is better, but as you'll see shortly, we many not have room for as much as we want.

Let's repeat the process, adding a 21 MHz trap and another section of tubing, and we now have a 20 meter vertical with two loading coils that also operates on 15 and 10 meters. How far can we take this? Well, the most complicated vertical I've seen so far worked on nine bands and had eight traps. For these examples, I used 28, 21, and 14 MHz, but there are no technical reasons why you can't build a 28/24/10 MHz version or a 24/18/7 MHz version. It's all marketing at this point. The antenna manufacturers are going to concentrate on building antennas for the most popular bands, because that's how they recover their investment in design and tooling (presumably, along with some profit). From an engineering point of view, the ratio of inductance to capacitance in each trap is very important to antenna efficiency and antenna impedance. Fortunately for us, though, the manufacturers take care of all that and we won't cover it here.

## Tuning a Trap Vertical

Tuning up a trap vertical can be really fun. On most trap verticals, the sections between the loading coils are adjustable, so you can tweak the antenna to your favorite part of each band. Except for perhaps 10 meters, a trap vertical usually will not tune the entire ham band, so you will need to decide if you want to do most of your operating at the high, the middle, or the low end of each band. Deciding ahead of time can save you a lot of work later.

One important thing to keep in mind is that adjustments often affect more than one band. If I make the 10 meter section just a little longer to work better

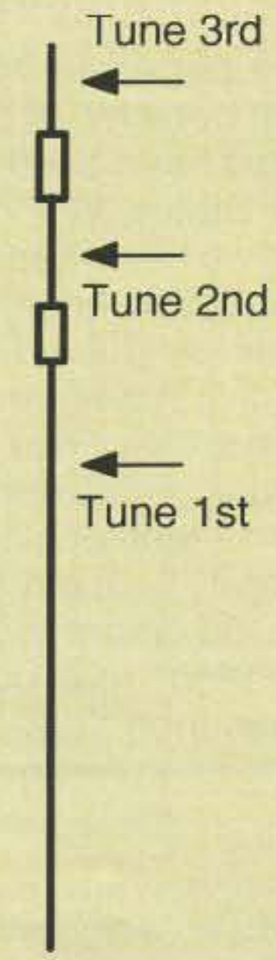



*Fig. 7– When tuning a trap vertical, always tune up from the bottom, starting with the highest frequency segment.*

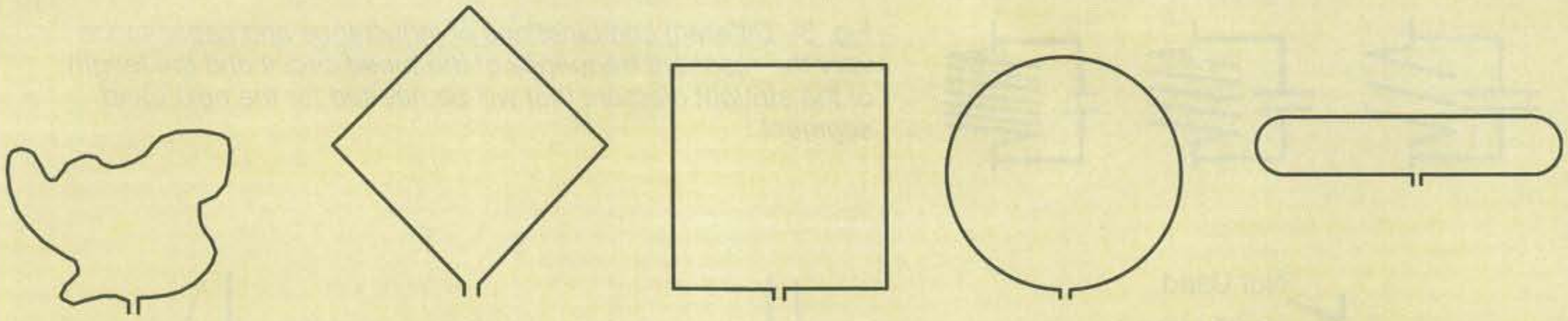


*Fig. 8– Different types of loop antenna designs. The shape has no bearing on polarization. Because all are fed on the bottom, these all are horizontally polarized elements. Side feeding will give you vertical polarization.*

at 28.1 MHz, then I just made the antenna longer for all the other bands as well. If I tweak just 20 meters, then I also change 30, 40, and 80 meters. Again, figure out just where you want to operate in each band and then tune the antenna from the top frequency down. Tune 28 MHz first, then 24 MHz, then 21 MHz, etc. (see fig. 7).

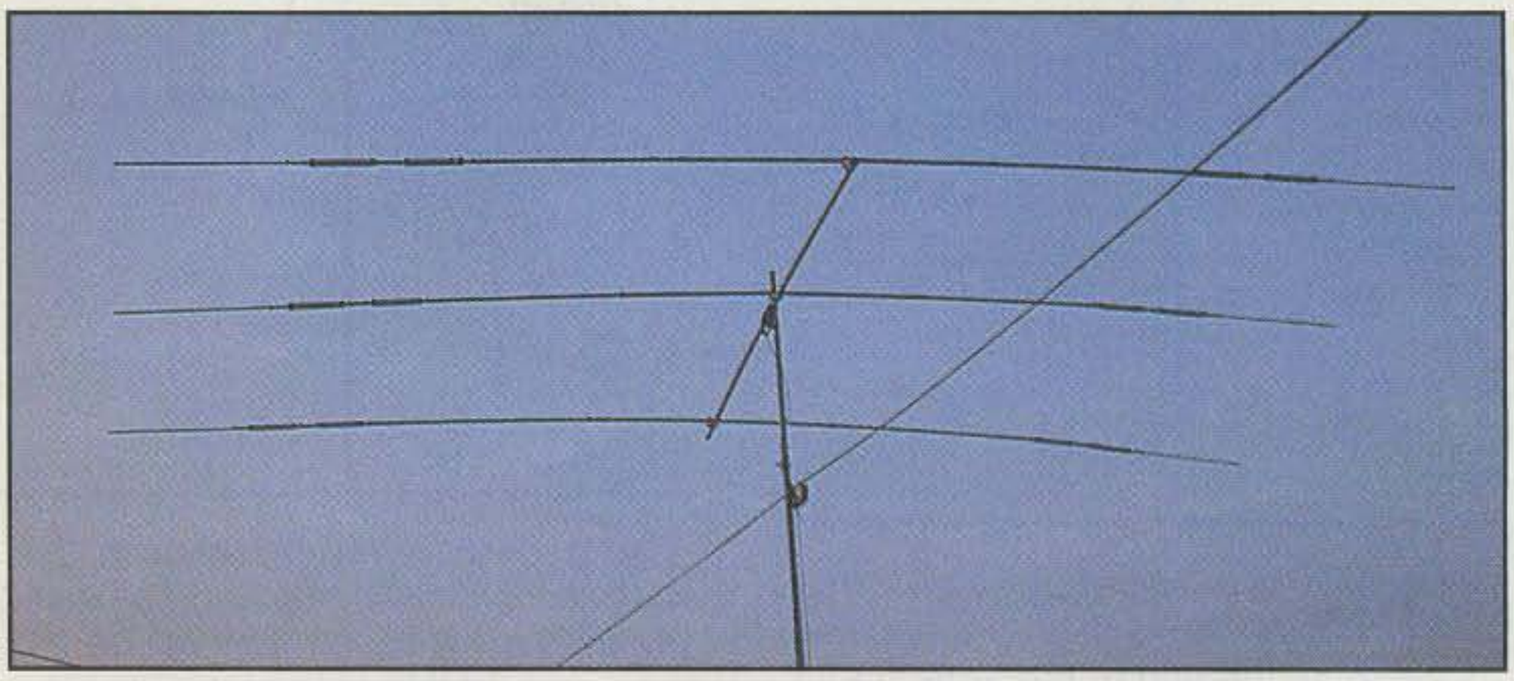
## What About a Yagi?

Well, if we can use traps to design a multiband vertical antenna, putting two of them together end to end gives us a multiband trap dipole. Put together two or three trap dipoles and (over-simplifying again) we have a multiband trap Yagi. Sounds like a good topic for a future column.

## Pet Peeves Regarding Antennas

My main pet peeve about antennas is that I am not a fan of quads. For nearly 20 years I have been an umpire at the Central States VHF Society antenna contest; we have measured about 2000 antennas over those years. The quad antennas we tested on the antenna range have never come close to their reputation. Only once, yes, once, has a quad won. That was eight years ago, when a 42 foot long 144 MHz monster quad barely beat out a 16 foot Yagi.

From 55 years ago we have the "observation" that quads have 2 dB more gain than Yagis.



*Take a half-dozen trap verticals, arrange them in three groups of two each laid end-to-end, and you have an overly simplified approach to building a three-ele ment triband Yagi. However, that's basicically what you're doing.*

The more correct statement would be: "Moore's carefully tweaked quad had 2 dB more gain than Moore's slapped together, non-optimized Yagi." Ladies and gentlemen, it was not a level playing field!

Another urban myth is that quads transmit vertical and horizontal polarization at the same time. I can firmly state that it is *impossible* for a simple structure to transmit an electromagnetic wave. It has its electric field in two planes, and at the same time it has its magnetic field in two planes. *You can't do it!*

Okay, for those of you who are qualified to write this column, yes, there is circular polarization. However, while a 145 MHz CP antenna changes from vertical to horizontal polarization 290 million times a second, it is *never* vertical and horizontal at the same time. A light bulb transmits a confused polarization, but the emitting structure is millions of wavelengths across, and it is emitting an extremely wide bandwidth of energy—hardly a coherent wave.

Back to quads. . . . When you have a loop encompassing a volume (and a quad is basically a loop), the shape of the wire is not important as far as polarization is concerned, just the feedpoint relative to the loop. Because all of the driven elements shown in fig. 8 are fed at the bottom-center, all of these elements are horizontally polarized. To get vertical polarization, you would feed them on the side.

I once had a 1296 MHz Loop Yagi that looked a lot like that first one in the diagram after an owl got its claws tangled up in it. The owl had landed on the element, and then the element crushed under its weight, trapping its feet and claws. Fortunately, the owl figured out how to get itself loose, but the antenna didn't work very well after that.

Now to back up a bit, quads obviously work, and there are some excellent reasons for using a loop as a driven element. These include impedance, bandwidth, dissipation of static, multiple bands, and a host of other sound technical benefits. However, I will not credit these antennas with violating Maxwell's equations for electromagnetic waves or for curing diarrhea, gout, or arthritis.

## Letters and Questions

Over the years my best topics for articles have come from your questions. Feel free to write to me at my Callbook address or via e-mail to <wa5vjb@cq-amateur-radio.com>.

73, Kent, WA5VJB

### Oops...

Our Ohm's Law calculator was broken when we were writing up the description of the power requirements for Kenwood's as-yet-unnamed new HF + 6-meter mobile radio in August's "Hot Stuff at Hamvention" article. On the 200-watt model, the maximum power drain is 40 amps at 12 volts DC. The radio does have two DC power inputs, but the maximum draw on each of them is 20 amps, not 40. For home use, according to Kenwood, the radio may be powered by dual 20-amp supplies or a single 40-amp supply split to the two inputs. If only one 20-amp supply is used, the radio will sense it and automatically drop down to 100 watts.

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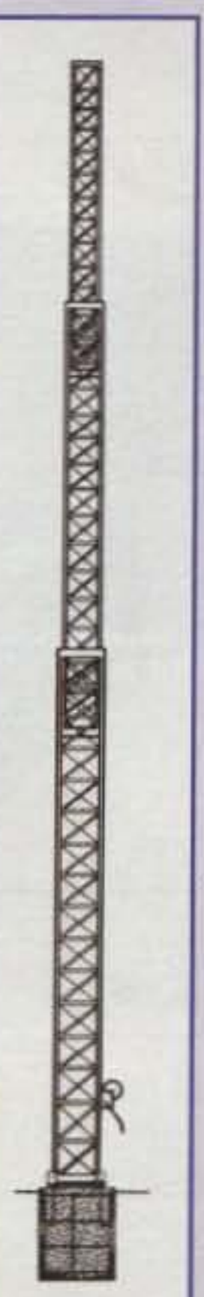

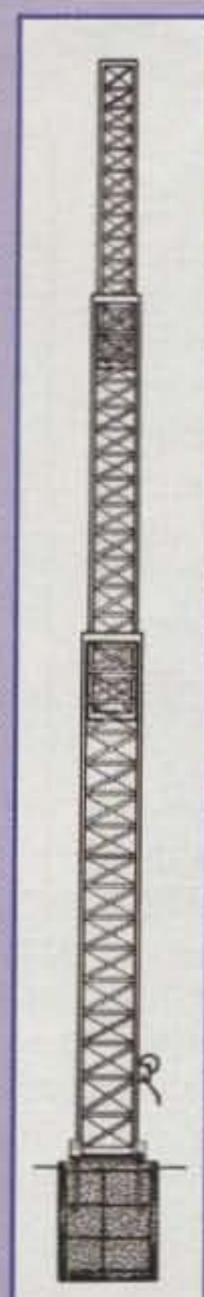

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• MDPL models include motor drive

• Options include coax arms, raising fixtures, masts, motor drives, and more!

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• Handles up to 22 square feet of antenna load. (See chart below)

• MDP & MDPL models include motor drive.

• All models supllied with anchor bolts, load-actuated hand winch, and house bracket.

• Options include coax arms, raising fixtures, motor drives, self-supporting and rotator bases, remote control panel, and more!

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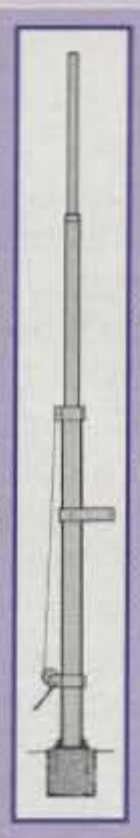

| MA SERIES CRANK-UP MASTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| MAST MODEL | MAX. HT. | MIN. HT. | WT. (LBS.) | 50 MPH (sq. ft.) | 70 MPH (sq. ft.) | LIST PRICE | SALE PRICE |
| MA-40 | 40' | 21'6" | 242 | 16.5 | 6.8 | $1,007 | $849 |
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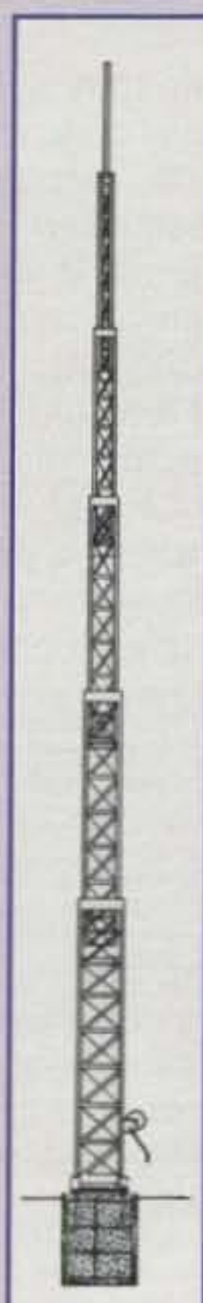
| MA-770 | 71' | 22'10" | 645 | 15.5 | 5.5 | $2,810 | $2,359 |
| MA-770MDPL | 71' | 22'10" | 830 | 15.5 | 5.5 | $4,445 | $3,729 |
| MA-850MDPL | 85' | 23'6" | 1128 | 15.3 | 6.3 | $5,991 | $5,029 |



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• Handles 20 square feet of antenna load at 50 MPH, 8 square feet at 70 MPH.

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how it works

BY DAVE INGRAM,* K4TWJ

# Amplifier Circuits—A Closer Look

If you followed our last two columns, you know we are having a ground-floor discussion of tubes, transistors, and FETs, plus the basic circuit configurations in which they are used (common emitter, common base, emitter follower, and vacuum-tube equivalents). This month we take our pursuit a step further to consider the role those devices and circuits play in modern communications gear. Specifically, we will look at single- and double-ended circuit configurations, plus parallel and push-pull arrangements such as those used in various types of amplifiers. Electronics often seems like an extensive and complex subject, and not all radio amateurs are technical wizards, so we strive to explain how things work in simple, easy-to-understand terms. Stick with us and we will expand your general knowledge of electronics tenfold! Let's open with a couple of "applicable to all aspects" notes to boost your understanding.

*Photo A– Sweep tube-type amplifiers such as this older Ameritron Model AL-84 typically use four parallel-connected tubes in a grounded-grid configuration to acquire medium-high output power. These small amplifiers are quite attractive, as they fit anywhere and operate from a regular 120 volt/ 10 amp AC outlet.*

## Opening Points

Understandably, many readers may ask how parallel and push-pull circuit designs mate with grounded-emitter, grounded-cathode, grounded-base, and grounded-grid circuits discussed in previous columns. Let's begin at that point. If you read our last two "How It Works" columns, discussing tubes and transistors interchangeably should now be easy. (If it isn't, and you didn't read those columns, go back and do so!) Likewise, referring to a common-emitter circuit in one place and a grounded-grid circuit in another should not be a problem.

Any circuit—from a receive preamp to a high-power linear amplifier—may use a common-emitter or a grounded-grid configuration in a single-ended, parallel or push-pull arrangement. Cathode followers or emitter followers are not included in that statement because they are usually employed as single-device buffers to isolate low-level stages. Likewise, the circuit(s) we consider may use tubes, transistors, or FETs as their "active amplifying devices." What is the difference? Push-pull typically uses two active devices, whereas parallel may use two, three, four, six, or occasionally even ten active devices (and it is still considered a single-ended arrangement). Confusing? It will make more sense as we continue.

## Parallel Circuits

When two or more same-type tubes or transistors are wired in a circuit with their elements direct-connected in parallel, the arrangement is referred to as a *parallel circuit*. Its purpose is to increase the utilized tube or transistor's size or surface area and produce more output power in the process. Electrically balancing the utilized tubes or transistors so they conduct equally and handle the same amount of current is challenging occasionally, but quite possible with some planning and patience. Using tubes with almost identical transconductance (a "matched set") or including low-value resistors (approximately 1 ohm) at each transistor's emitter usually does the trick.

A popular example of a linear amplifier using a pair of parallel-connected 572B triode tubes in a grounded-grid circuit arrangement is shown in fig. 1. For simplicity, only the RF deck section is shown. Notice how the filaments of both tubes are connected in parallel and three .01 µF capacitors direct RF energy from the driving transceiver to both sides of each filament. Also notice how separate parasitic suppressors are used (PC1, PC2), but the tubes' plates are still parallel-connected to the pi-network output circuit. This arrangement is quite common for parallel circuits. Two more tubes could be added (in parallel) to double this amplifier's power, assuming the amplifier's filament transformer and plate transformer could handle the extra current demands. Adding additional capacitance to the high-voltage supply would also be a good move at that time, as it would ensure good voltage stability under the heavier load. That is why big amplifiers use large (huge!) capacitors.

Could more than four (smaller) tubes be connected in parallel to make a high-power amplifier? Possibly. SBE's classic linear amplifier used six sweep tubes and the Galaxy Electronics "Golden

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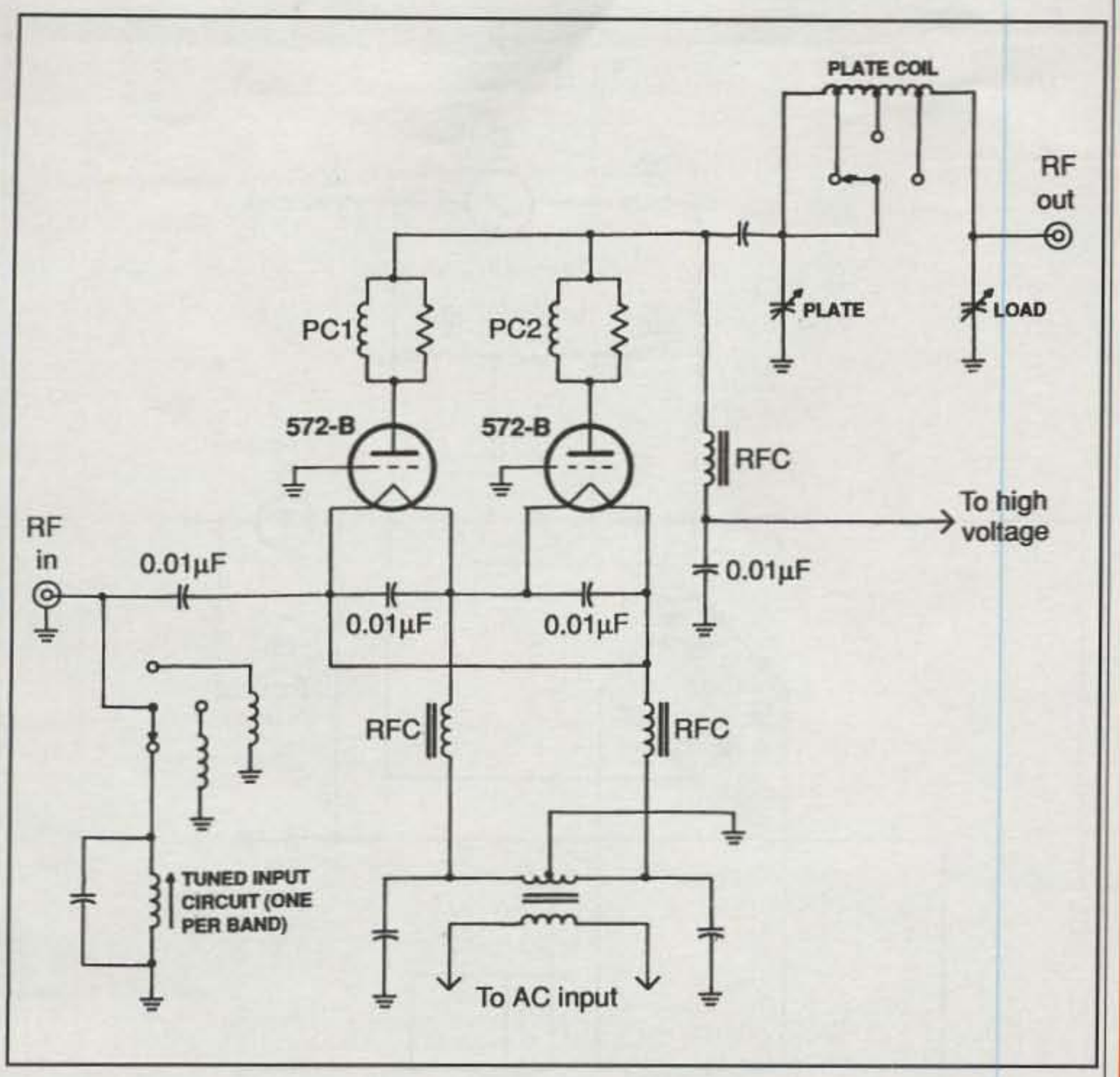


*Fig. 1– Streamlined circuit diagram of a 572B linear amplifier with parallel-connected tubes. Power supply, antenna switching, and other support sections were omitted for simplicity. (Discussion in text.)*

Oldie" amp used ten sweep tubes(!), but there are stipulations. The maximum number of tubes (or transistors, or power MOSFETs) used in an amplifier typically is determined by distributed capacitance. When more than four tubes are employed, the additional distributed capacitance in their wiring limits its operation on upper HF bands such as 10 and 12 meters. That is the "technical angle." The other hitch is cost. Four sweep tubes are slightly expensive, but six or ten of them can empty a wallet—and quickly!

As further clarification of parallel-connected tubes and grounded-grid circuits, let's take a brief look at the neat little Ameritron AL-84 sweep-tube amplifier shown in photo A, with its circuit diagram in fig. 2. Here RF input from the station transceiver routes to T/R relay RL1, where it is jumpered to the antenna (RF Out) on receive. When keyed to transmit (by grounding the connection at "RLY" and thus applying 12 volts to RL1's coil), RF drive routes through R1 and C5 to the four cathodes. All three grids on all four tubes are paralleled to increase their total surface area and are connected to ground. Likewise, all four plates are paralleled and connected to the multiband pi-net output circuit (C8, L1, L2, and C9) through C7, which passes high RF energy but blocks DC coming from the power supply through RFC2. Did you catch that "traffic cop routing," friends? DC goes through RFC2 to the tubes, but C7 blocks it from going to the pi-net and antenna. Similarly, C7 passes RF energy to the pi-net and antenna, while RFC2 stops it from going to the power supply. In the event that a trickle of RF energy slips through RFC2, C6 stands ready to bypass it to ground so it does not adversely affect the power supply.

Now notice the clever input circuit on this amplifier. It consists of R1, a 22 ohm, 50 watt non-inductive resistor which in conjunction with C5 and the four paralleled cathodes totals around 50 ohms and presents a low SWR to the driving transceiver. It also eliminates the need for separate/switched input circuits on each HF band, plus it dissipates 50 watts of drive and thus satisfies FCC rules pro-


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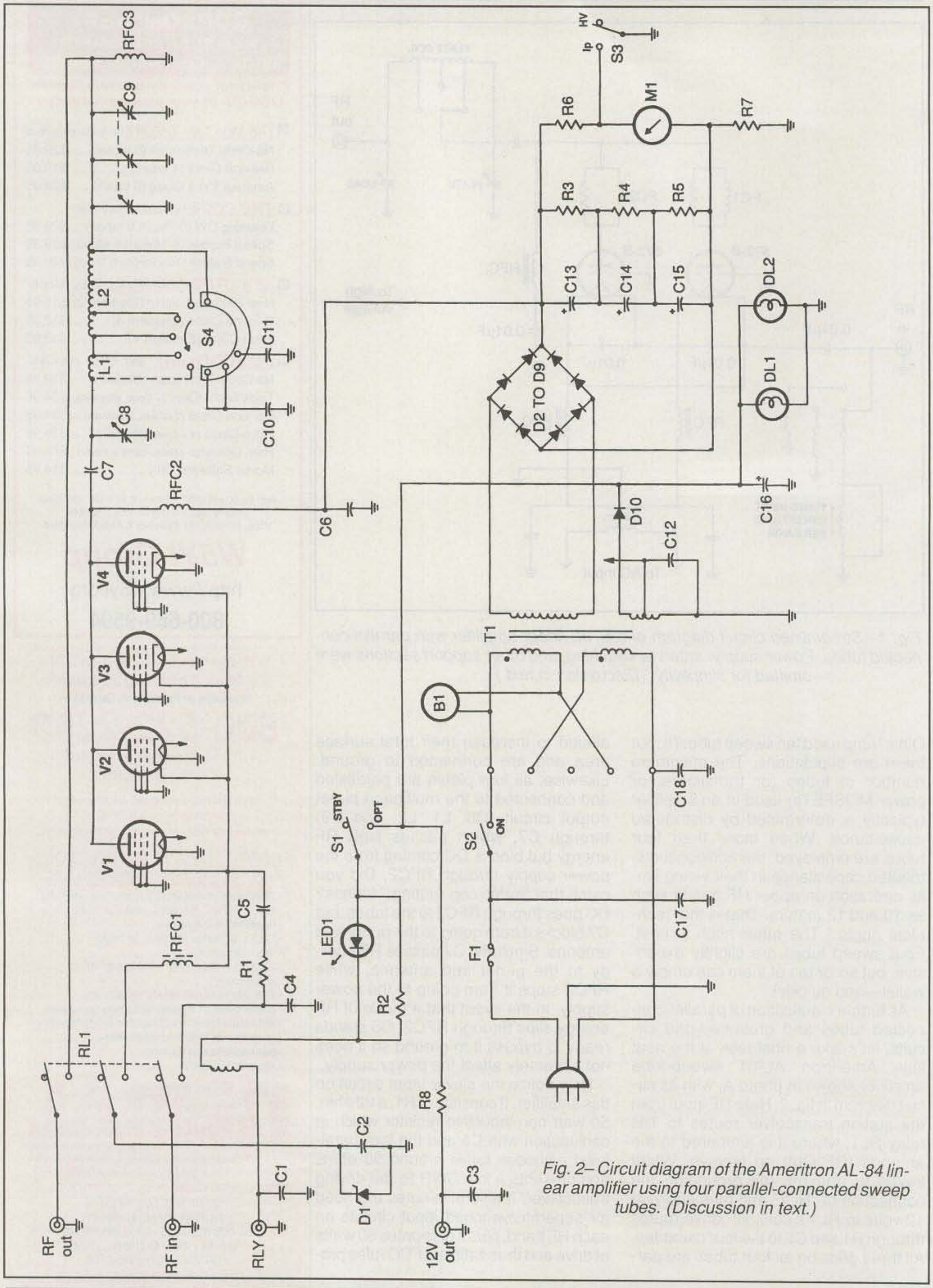


*Fig. 2– Circuit diagram of the Ameritron AL-84 linear amplifier using four parallel-connected sweep tubes. (Discussion in text.)*



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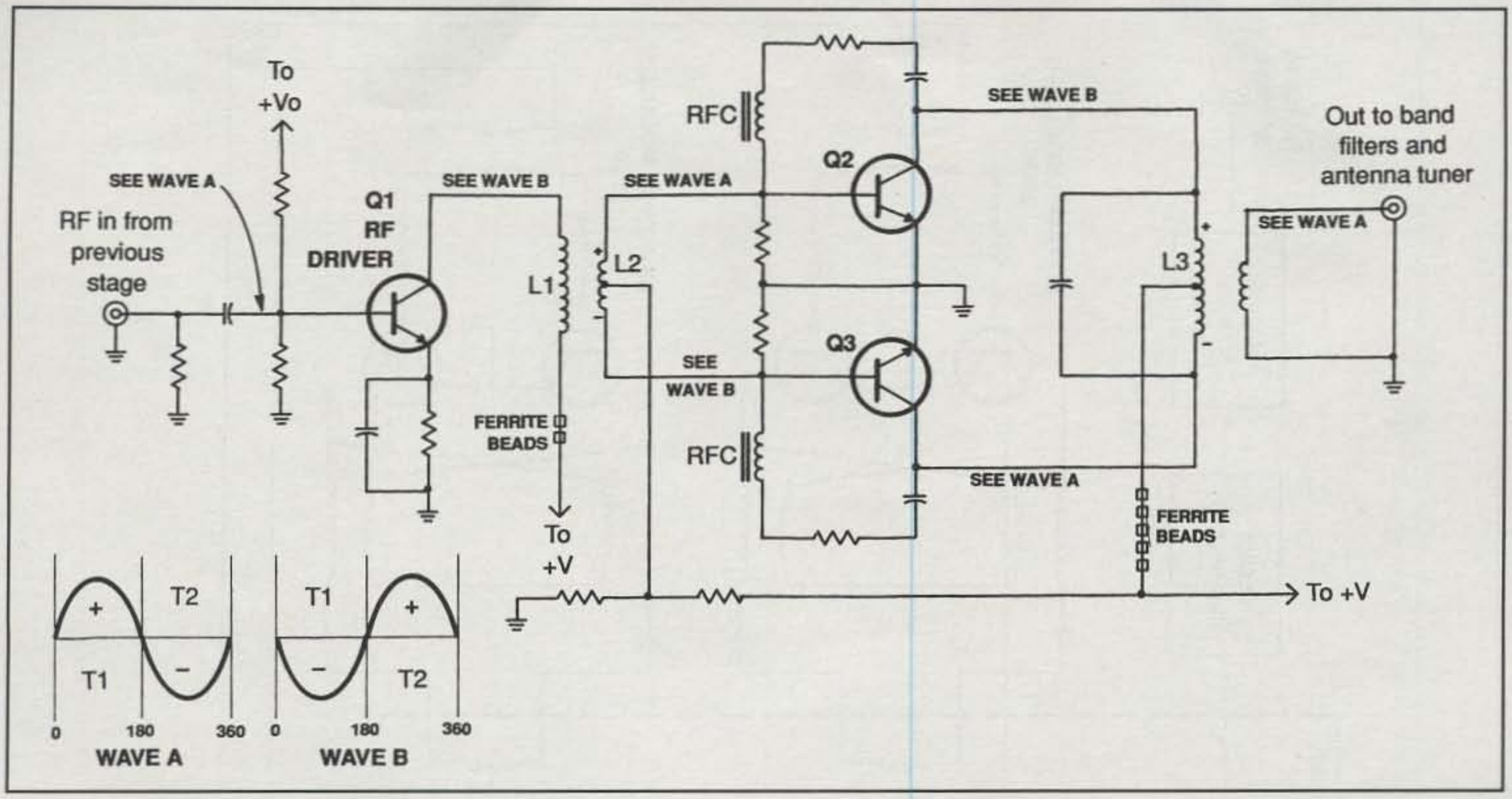


*Fig. 3– Simplified circuit diagram of the RF power amplifier section in an ICOM IC-761 transceiver. The concept of operation is explained under the heading "Push-Pull circuits" in the text.*

*Photo B– ICOM's new-style IC-PW1 linear amplifier uses eight power MOSFETs in a quad push-pull configuration to deliver 1000 watts output. The amplifier is fully remote controlled and includes a built-in 1000 watt automatic antenna tuner.*

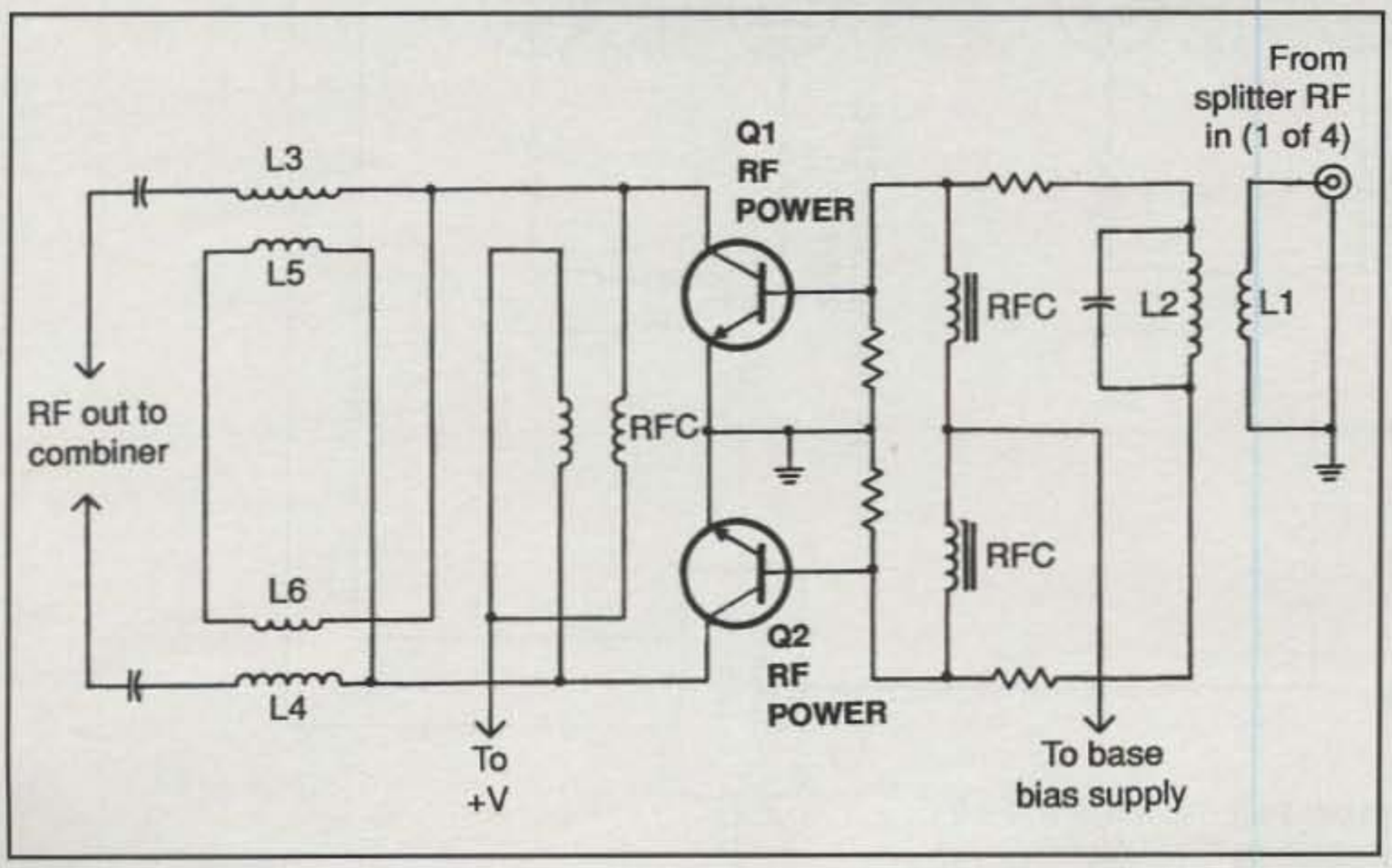


*Fig. 4– Condensed outline for one of the four 250 watt output push-pull amplifier modules used in ICOM's 1000 watt output IC-4KL linear amplifier. The newer IC-PW1 amplifier is similar in concept, but uses eight power MOSFETs, two per module. (Discussion under "Push-Pull Circuits" in text.)*

hibiting operation with a 5 watt CB radio. What about biasing? On receive, the tubes are biased at cut-off (no idling current) by disconnecting the left/RL1 side of RFC1. Then on transmit, the middle contact on RL1 connects the left side of RFC1 to D1, a 7.5 volt zener diode. As a result, the tubes' cathodes are raised 7.5 volts above ground (the voltage drop across D1), idling current increases to 200 ma, and the amp is biased for class AB2 operation.

That is the story in a nutshell. Now while it is still fresh in your mind, try your hand at figuring out other amplifier circuit diagrams for practice.

## Push-Pull Circuits

A push-pull circuit is both unique and distinctive in that it uses two of the same type of tubes, transistors, or FETs in a balanced or symmetrical type arrangement so the circuit's "upper half" is a mirror image of its "lower half." Its purpose is to boost, or amplify, an input signal with good efficiency and clarity while reducing second and fourth harmonic energy in the process. As an extra benefit, each tube, transistor, or FET in a push-pull circuit conducts (alternately) during only half, or 180 degrees, of the incoming signal's wave and rests, or cools, during the other 180 degrees.

As an example of how push-pull works, let's look at a simplified circuit

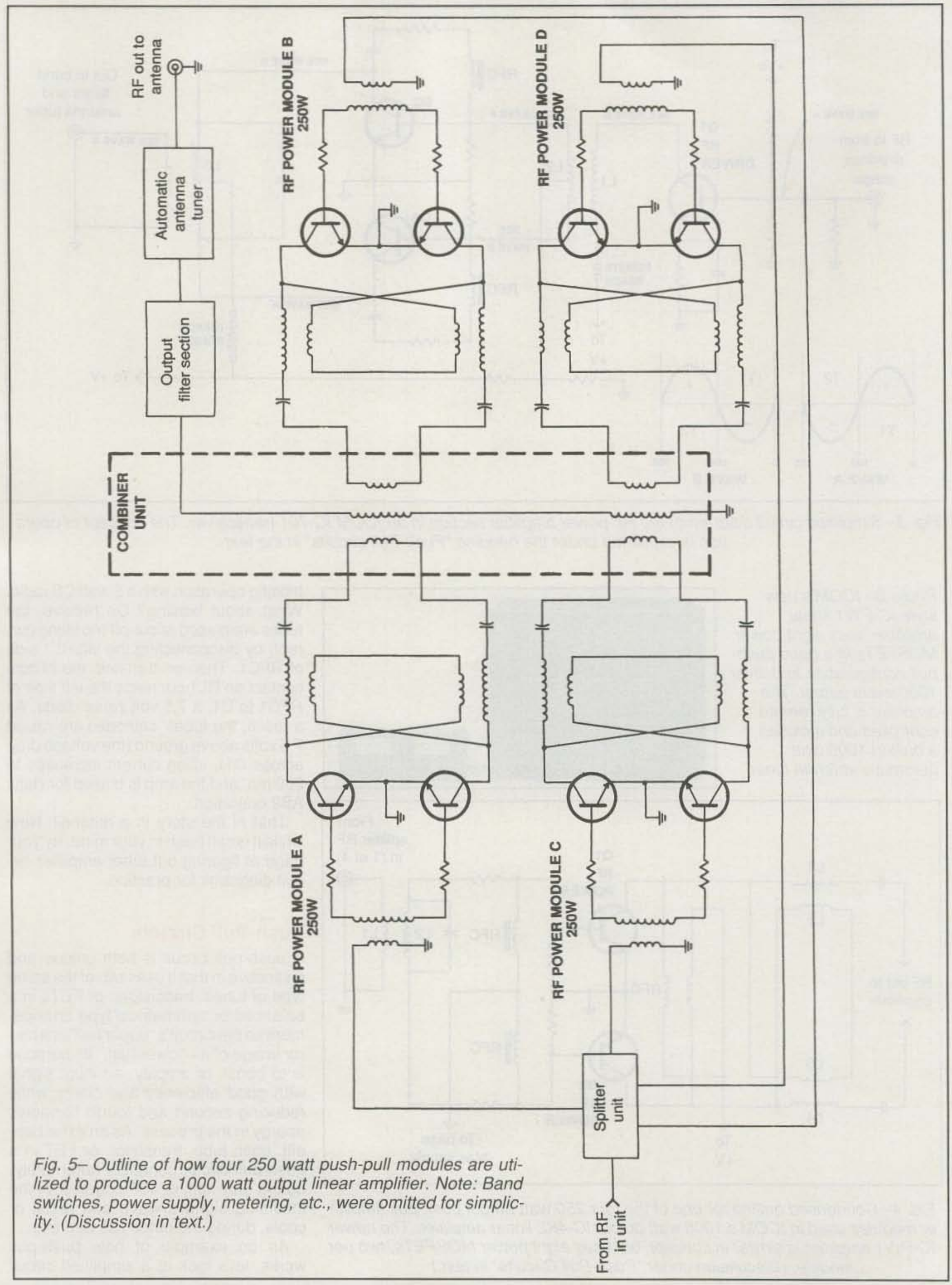


*Fig. 5– Outline of how four 250 watt push-pull modules are utilized to produce a 1000 watt output linear amplifier. Note: Band switches, power supply, metering, etc., were omitted for simplicity. (Discussion in text.)*

diagram of the 100 watt power-amplifier stage in an ICOM IC-761 transceiver (fig. 3). Here the low-level transmit signal from RF driver Q1 and L1 is first split into positive and negative alternations by L2, which is center tapped. During one alternation (T1) the "top" of L2 will be positive and the "bottom" will be negative. During this 180-degree period, the base of Q2 will be forward biased so it can conduct, amplify, and deliver half of the resultant sine wave to the top half of output coil L3. During that same time, negative voltage on the base of Q3 kept it switched off. During the next (180-degree) alternation of the incoming signal (T2), the "top" of input coil L2 goes negative while the "bottom" goes positive. Now the base of Q2 is reverse biased so it switches off and cools, while Q3, with positive/forward bias on its base, conducts, amplifies, and delivers the other half of the output sine wave to the "bottom" of output coil L3.

The subject of forward and reverse biasing, incidentally, was covered in our May "How It Works" column. Right now is a good time to review that column. Using separate color pens to follow positive and negative alternations of waves through the circuit also helps.

Now let's briefly consider some additional and quite interesting applications of push-pull circuits.

While many linear amplifiers employ vacuum tubes connected in parallel, ICOM uses power transistors and MOSFETs connected in push-pull to develop a high-power signal with low harmonic content. A condensed and simplified example of one such ICOM push-pull circuit or power-amplifier module is shown in fig. 4. It is comparable to a beefed-up version of the IC-761's power-amplifier circuit (which outlasts even the Energizer bunny!). ICOM's IC-2KL desktop linear amplifier uses two of these hefty 250 watt output PA modules driving a combiner circuit to produce 500 watts output. ICOM's larger IC-4KL kilowatt amplifier uses four of the modules to deliver 1000 watts output (fig. 5). ICOM's newer IC-PW1 also uses four similar PA modules, but they employ MRF-150 power MOSFETs rather than power transistors. The IC-4KL and IC-PW1 also sport 1000 watt automatic antenna tuners, which are the highest power rated "auto tuners" available today. When mated with an ICOM transceiver, they really make HF operations delightful. You just punch on the transceiver, select a band, set a desired power level with the transceiver's "power" control, and the amplifier follows right along with you. The auto tuner ensures a low SWR, and the whole station is automatic. It's terrific!

## Conclusion

We hoped to include an overview of class A, B, and C operation in this month's discussion of amplifiers because the two subjects are closely related, but there simply was not room. Stay tuned for coverage of those topics next time. Also, your notes asking for more ground-floor information on basic components, their varieties, and applications have been received, and we will return to those topics as soon as we can reach a "holding pattern" on amplifiers. Thanks for your support and encouragement.

73, Dave, K4TWJ


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what's new

BY KARL T. THURBER, JR.,* W8FX

# DSP PC Radio, Radio Surplus, Tactical Communications Bridge, and more

This month in your "What's New" column we shine the ever-bright *CQ* product spotlight on a variety of new radio shack gear and accessories, antenna-related goodies, radio resources, and much more we think will be of interest to you, so let's get started.

*Photo A– The cutting-edge, software-based technology used in the Ten-Tec RX-320D DRM-software-compatible HF DSP PC Radio reduces the number of individual electronic components inside the "black box." This makes it possible to provide features only dreamed of in previous receivers in this price class. A top view of the radio's circuit board is shown here. (Photo courtesy Ten-Tec)*

## Radio Gear

**Ten-Tec's DRM-Software-Compatible Off-the-Shelf Receiver.** The introduction of the original Ten-Tec RX-320 HF Digital Signal Processing (DSP) "PC Radio" in 1998 perhaps marked the first time that the power of a personal computer could be harnessed and dedicated to superb-quality shortwave listening. Instead of traditional discrete electronic components inside the radio, the RX-320 utilized digital signal processors inside the "black box" and used a PC for the horsepower to run the radio.

Ten-Tec now offers "plug-and-play" capability for the new Digital Radio Mondiale (DRM) digital broadcasting standard in the new RX-320D radio. The RX-320D is a standalone black box that only requires access to a serial port and 1 MB of free hard-drive space for the Windows®-based software; there's no need to go inside your PC or tie up an accessory slot. The PC radio includes a built-in telescoping whip antenna, or you can extend listening range significantly with a simple external wire antenna.

Like many conventional receivers, the RX-320D tunes from 100 kHz to 30 MHz. However, the similarity stops there, as this is a true DSP-based receiver, and the software-based technology significantly reduces the number of electronic components inside the radio (see photo A). This makes it possible to provide features only dreamed of in previous receivers in this price class. Included with the RX-320D are a detachable, collapsible whip antenna; graphical user interface (GUI) software; serial port and I-F output cables; a 110 VAC wall transformer; and an operation manual that includes a handy shortwave guide.

At this point you might ask what Digital Radio Mondiale (DRM) is. DRM is a consortium of radio and electronics manufacturers formed in the late 1990s to create a universal digital system for the AM broadcasting bands below 30 MHz. The resultant DRM system is the world's only non-proprietary, digital system for shortwave, medium-wave, and longwave, with the ability to use existing frequencies and bandwidth. Still confused? Check out the extensive questions and answers provided on the official DRM website at <http://www.drm.org/newsevents/globfaqs.htm>.

To hear DRM broadcasts you need to have a capable radio and DRM decoding software. The software is only available via the DRM Software Radio website at <http://www.drmrx.org>; it's not available through Ten-Tec or others. For a list of specific computer operating system and sound-card requirements to successfully decode DRM signals, go to the DRM software purchase page at <http://www.drmrx.org/purchase.php>.

Ten-Tec is also providing an upgrade program for current RX320 owners who want to have DRM capability added to their existing radio. Contact Ten-Tec directly for details: Ten-Tec, Inc., 1185 Dolly Parton Parkway, Sevierville, TN 37862 (1-800-833-7373; e-mail: <sales@tentec.com>; on the web: <http://www.tentec.com>).

## Accessories for the Shack

**TCB-I Tactical Communications Bridge I from Link Communications, Inc.** The TCB-I Tactical Communications Bridge I (photo B) is said to be an ideal product for Amateur Radio Emergency Services (ARES) use, search-and-rescue operations, and portable repeater work where setup time can mean the difference between life and death. Features include two full-duplex radio ports, an RS-232 programming and control port, and seven output control lines. There are two minutes of digital voice storage per radio port for simplex/repeater operation, along with an additional two minutes for IDs and user messages. The unit can be programmed remotely with DTMF and comes standard with IDs and courtesy beeps. Interfacing is as simple as connecting receiver audio, microphone audio, and PTT cables to the unit. Making use of

*289 Poplar Drive, Millbrook, AL 35054-1674
*e-mail: <w8fx@cq-amateur-radio.com>*



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*Photo B– Link Communications, Inc. has introduced the TCB-I Tactical Communications Bridge I, said to be an ideal product for Amateur Radio Emergency Services (ARES) use, search-and-rescue operations, and portable repeater work. (Photo courtesy Link Communications, Inc.)*

the built-in radio settings database, the user simply dials up the radio being interfaced to the TCB-I.

The TCB-I automatically recalls the setting for the selected radio, therefore reducing the setup time. Operational modes can be changed with the flick of the front-panel modes switch, allowing rapid operational changes. The unit operates from either 12 VDC or with the included AC adapter. The TCB-I is said to be an excellent product for a club or individual's emergency-preparedness package.

For more information, contact Link Communications, Inc., 1035 Cerise Rd., Billings, MT 59101 (1-800-610-4085; e-mail: <info@linkcomm.com>; on the web: <http://www.linkcomm.com>).

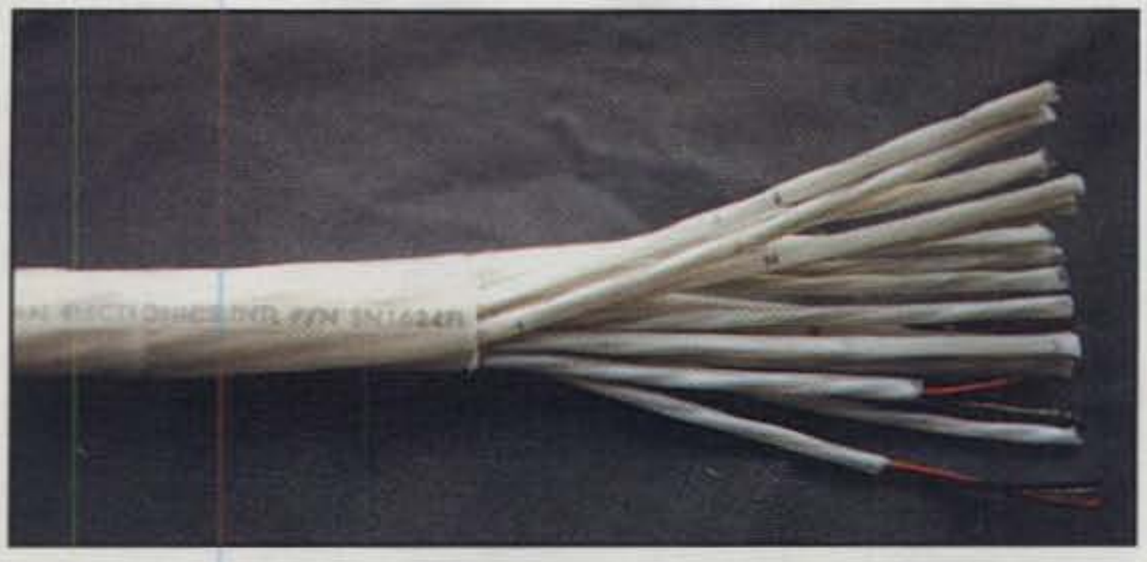

*Photo C– Nemal Electronics International has introduced a new series of audio snake cables for high-end applications requiring a plenum-rated cable. The cable is available in constructions containing two to 24 pairs. Part No. SN1624PL consists of 16 individually shielded and jacketed pairs with an over all jacket. (Photo courtesy Nemal Electronics International)*

**Nemal Plenum Audio Snake Cable.** Nemal Electronics International is a respected manufacturer and distributor of a wide variety of electronic cables, connectors, cable assemblies, and patch panels. Recently Nemal introduced a new series of audio snake cables (photo C) for high-end applications requiring a plenum-rated cable (a fire-retardant cable suitable for running in air ducts and in spaces between floors and ceilings).

The new cables are available in constructions containing two to 24 pairs. Part Number SN1624PL consists of 16 individually shielded and jacketed pairs with an overall jacket; digital versions (SNX24PL series) also are available. The new cables facilitate rapid, neat installation of systems requir-

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RG8 Mini (X) strd BC Foam 95% Braid
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*Photo D– The Ameritron RCS-10 8-Position Remote Coax Switch selects one of eight antennas using an inexpensive, three- or four-conductor control line. The RCS-10, shown here, consists of two units, the weatherproof switchbox which mounts on your tower or mast, and the control unit for your operating position. (Photo courtesy Ameritron)*

*Photo E– Universal Radio was founded in 1942 by F. R. "Gibby" Gibb, W8IJ, shown here. Universal Service, as it then was called, was located in downtown Columbus, Ohio. Universal Radio, now located in Reynoldsburg, has been owned by Barb and Fred Osterman since 1982. They continue to publish an attractive, comprehensive paper catalog. (Photo from the Universal Radio website)*

ing multiple audio pairs, and the numbered individual jackets provide for easy, positive identification. Outer jackets are available in either natural (standard) or other colors by special order. The company also manufactures connectors and tooling for the plenum cables.

Nemal offers products with UL approval as well as custom designs for enhanced flexibility, high-frequency performance, sunlight resistance, direct burial, or other requirements. The firm stocks more than 3000 cable and connector products for same-day shipment, including all types of RF connectors.

For more details, contact Nemal Electronics International, 12240 N.E. 14th Ave., North Miami, FL 33161 (1-800-522-2253; e-mail: <info@nemal. com>; on the web: <http://www.nemal. com>). The entire Nemal catalog is available online at the website.

## Antennas and Accessories

**Ameritron RCS-10 8-Position Remote Coax Switch.** Ameritron's new RCS-10 remote coax switch selects one of eight antennas using inexpensive three- or four-conductor control line, such as standard telephone wire. With the RCS-10, attractively priced at $159, you can eliminate a tangle of troublesome coax and have a simple, neat installation with just a single coax feedline. The RCS-10 consists of two units: the weatherproof switchbox, which mounts on your tower or mast, and the control unit, which is placed at your operating position (photo D). The 50 ohm unit has a high power-handling capability—over 5 kW into matched loads below 30 MHz. Overall frequency coverage is to at least 100 MHz.

The hardware accepts mast sizes from 1 inch to 2 1/4 inches; Teflon® UHF-style SO-239 female coax connectors and an internal barrier strip for control lines are provided. The unit features sealed relays, stainless-steel hardware, and a UV-resistant cover. The RCS-10 also sports easy-to-read antenna indicators; eight wide-spaced LEDs indicate the selected antenna.

The RCS-10 requires 10–15 VDC, or 120 VAC with AC adapter supplied. The comparable RCS-10X requires 10–15 VDC, or 230 VAC with AC adapter supplied. The RCS-10L ($199) is the same as the RCS-10, but it has lightning protection for all inputs.

In other news from Ameritron, the firm now is offering extended warranty plans. The Ameritron extended warranty plan is the same as the original warranty, but coverage is extended for the number of months described on your purchase invoice. Also, Ameritron now offers online ordering for its parts and accessories; simply go to the website, choose the products you want, place them in your shopping cart, and then check out.

Another nice touch is that the complete Ameritron parts list now is available online at the website. Finally, the company has announced that it now offers professional repairs on the Heathkit SB-1000 amplifier. Look for service details online.

For more information or a free print catalog, contact Ameritron, 116 Willow Rd., Starkville, MS 39759 (1-800-713-3550; e-mail: <ameritron@ameritron.com>; web: <http://www.ameritron. com>).

## From the Bookshelf

**New Communications Catalog from Universal Radio.** In these days of "go to our website for information," it's refreshing to note that some suppliers still publish comprehensive paper catalogs. Universal Radio has issued a periodic update to its well-illustrated, large-format catalog. The latest 104-page "2003 Communications Catalog" is an excellent ordering and reference resource that covers equipment for the amateur radio, shortwave, and scanner buff alike.

An impressive selection of antennas, headphones, books, and accessories also is featured in the catalog; many brand-new items also make their debut on its pages. Also, while the focus is on shortwave and scanner equipment, there's no lack of coverage of the latest amateur radio gear and accessories in the new catalog. Incidentally, we should mention that Universal Radio has been around for a long time. The firm was founded in 1942 by the late F. R. "Gibby" Gibb, W8IJ (photo E). Universal Service, as it was called back then, was located on North Third Street in downtown Columbus, Ohio. Universal carried all the major lines of the time, including Millen, Drake, Collins, Hammarlund, Hallicrafters, Johnson, and National. After Gibby became a Silent Key, his wife briefly ran the business and then sold it to another owner in 1977, who moved it to Reynoldsburg. Universal Radio has been owned by Barb and Fred Osterman since 1982.

The catalog is available free on request by fourth-class mail, or for $3 by Priority Mail. Outside North America, send

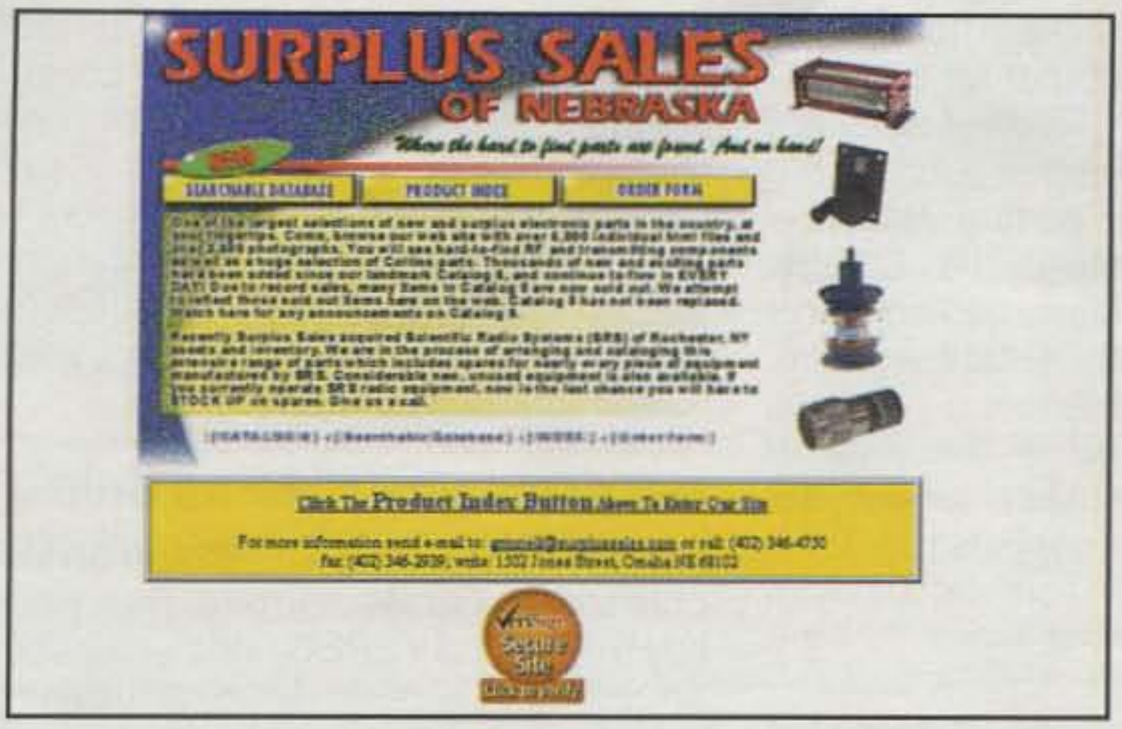


*Fig. 1– Surplus Sales of Nebraska has one of the largest selections of new and surplus electronics parts in the country. The website, at <http://www.surplussales.com>, is full of goodies of interest to radio amateurs, experimenters, and homebrewers. A very sophisticated online searchable database and recent acquisitions have made the website even more attractive. (Graphic from the Surplus Sales of Nebraska website)*

five IRCs for postage. For your copy, contact Universal Radio, Inc., 6830 Americana Parkway, Reynoldsburg, OH 43068-4113 (1-800-431-3939; e-mail: <dx@universal-radio.com>; web: <http://www.universal-radio.com>).

## Radio Resources

**News from Surplus Sales of Nebraska.** With the marketing motto "where the hard to find parts are found and on hand,"

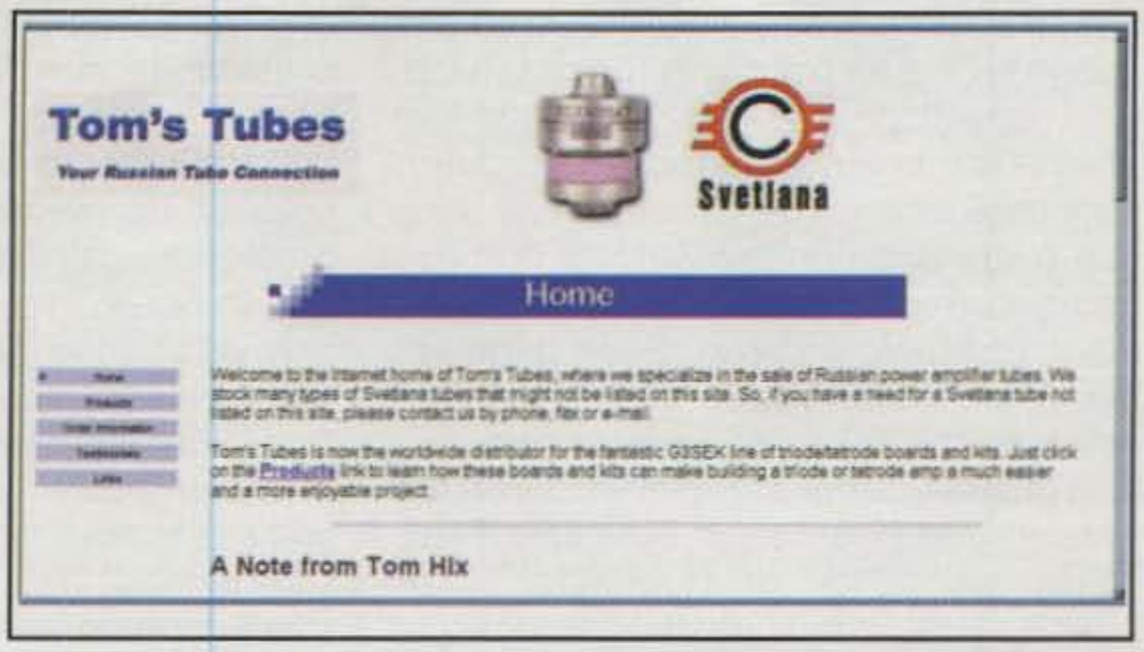


*Fig. 2 – A visit to the Tom's Tubes website, <http://www.tomstubes.com>, shows that Tom's Tubes specializes in the sale of Russian power amplifier tubes. Tom's Tubes is now the U.S. distributor for G3SEK's Triode and Tetrode amplifier control boards and kits. See the text of this month's column for details.(Graphic from the Tom's Tubes website)*

Surplus Sales of Nebraska has one of the largest selections of new and surplus electronics parts in the country. The Surplus Sales website (see fig. 1), which you'll find at <http://www.surplussales.com>, is chock full of goodies of interest to radio amateurs, experimenters, and homebrewers.

This large selection now is available online; the attractive website boasts over 6000 individual, HTML-based files and over 3500 photographs. The really good news is that the website has an excellent searchable database. You can enter words describing a product or item, or you can enter specific product names. If you have an exact part number, you can


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key it in as well. Any word that is on any page on the website is in the database.

The website is very large, and certain items are cross-referenced into different categories. The database will bring up every page on the website that has an occurrence of the name or keyword that you have entered. Each page will be listed, so all you have to do is then click on the link to go to that page.

Recently Surplus Sales acquired the assets and inventory of Scientific Radio Systems (SRS) of Rochester, New York. The firm is in the process of arranging and cataloging this extensive range of parts, which includes spares for nearly every piece of equipment manufactured by SRS. Watch the website for details.

Finally, Surplus Sales acquired Hi-Manuals of Council Bluffs, Iowa, known for offering a large, high-quality library of over 7000 original "old ham manuals" covering the period 1935 to 1980 (and then some). The manuals are shipped via Priority Mail paid on all domestic orders of ham manuals; test equipment and commercial equipment manuals don't include free delivery. Surplus Sales reportedly ships 99% of all manuals within 24 hours.

Contact Surplus Sales of Nebraska, 1502 Jones St., Omaha, NE 68102 (1-800-244-4567; e-mail: <grinnell@surplussales.com>; <http://www.surplussales.com>).

**Tom's Tubes to Distribute G3SEK Triode and Tetrode Boards.** Tom's Tubes, owned by Tom Hix, W4TH, now is the U.S. distributor for G3SEK's Triode and Tetrode amplifier control boards and is the worldwide distributor for the component kits. For power-amplifier builders, the boards offer a complete solution for amplifier control and tube protection. (We profiled the G3SEK Triode Board in our May 2000 column.)

A visit to the Tom's Tubes website, <http://www.tomstubes.com>, shows that Tom specializes in the sale of Russian power amplifier tubes; the website is billed as "Your Russian Tube Connection" (fig. 2). Tom also stocks many types of Svetlana tubes that are not listed on the site.

The tubes are brand new; they are not "pulls." Tom buys tubes in very large quantities, and in so doing, he can pass on the savings to you. He reports that the current crop of tubes he's getting are the among the best, and they are arriving in well-constructed boxes offering a great deal of protection.

Tom also notes that the most popular tube he sells is the Svetlana 4CX800A/GU74B, used in several popular RF amplifiers. The second most popular tube he sells is the 4CX400A, an especially great tube for Dentron MLA-2500 owners who are looking to replace the very difficult to find Eimac 8875 tubes. (Check the Svetlana website at <http://www.svetlana.com> for technical information on how to go about tube substitution.)

For more information, contact Tom's Tubes, 190 East Hwy., Boaz, AL 35957-6430 (256-593-0077; e-mail: <w4th@tomstubes.com>; on the web: <http://www.tomstubes.com>). For additional information on the triode and tetrode boards, you may also wish to contact Dr. Ian F. White, G3SEK, at IFW Technical Services, 52 Abingdon Road, Drayton, Abingdon, Oxfordshire, OX14 4HP, England (telephone: +44-1235-535981; e-mail: <boards@ifwtech.co.uk>; on the web: <http://www.ifwtech.co.uk/g3sek/boards>).

## More Genuinely Useful Stuff

**Technical Training Videotape on Oscilloscope Fundamentals.** Rick Kent, K1RRK, of SYSPEC, Inc., recently announced a new technical training videotape designed to acquaint hobbyists and technicians with the fundamentals of using an oscilloscope. The VHS videotape is designed to take the mystery out of using the instrument to make basic signal measurements. It assumes no prior oscilloscope knowledge and begins with a detailed presentation about scope controls as well as interpreting displayed waveforms.

The training video provides details on how to set up the various controls for making accurate voltage and period measurements for a wide range of signals, including sine, square, and sawtooth waveforms. The video-and-manual package also includes a free, 70-page oscilloscope technical training manual which offers many examples of waveform measurements and includes a number of exercises designed to increase the reader's proficiency. A section on oscilloscope setup helps you choose the proper time base, vertical sensitivity, and trigger mode based on the type of signal being measured.

The video-and-manual package is designed by Rick, who is an electrical engineer and college professor. It's priced at $34.95 plus $5 s/h in the continental U.S. For more information, contact SYSPEC, Inc., P.O. Box 2546, Syracuse, NY 13220 (1-877-SYSPEC1; e-mail: <support@syspec.com>; on the web: <http://www.syspec.com>).

## Wrap-Up

That's all for this time, gang. Next time more "What's New." See you then.

*Overheard:* I've found that success in any endeavor is determined largely by just what I'm willing to sacrifice for its attainment. 73, Karl, W8FX

### Errata

In the July column on page 87 we mentioned the QFile™ QSL card index dividers from Radio Warehouse. The correct web address is <http://www.radio-warehouse.com>.

# Radio Redux: A Look Back at Wisconsin

BY JOE VERAS,* N4QB

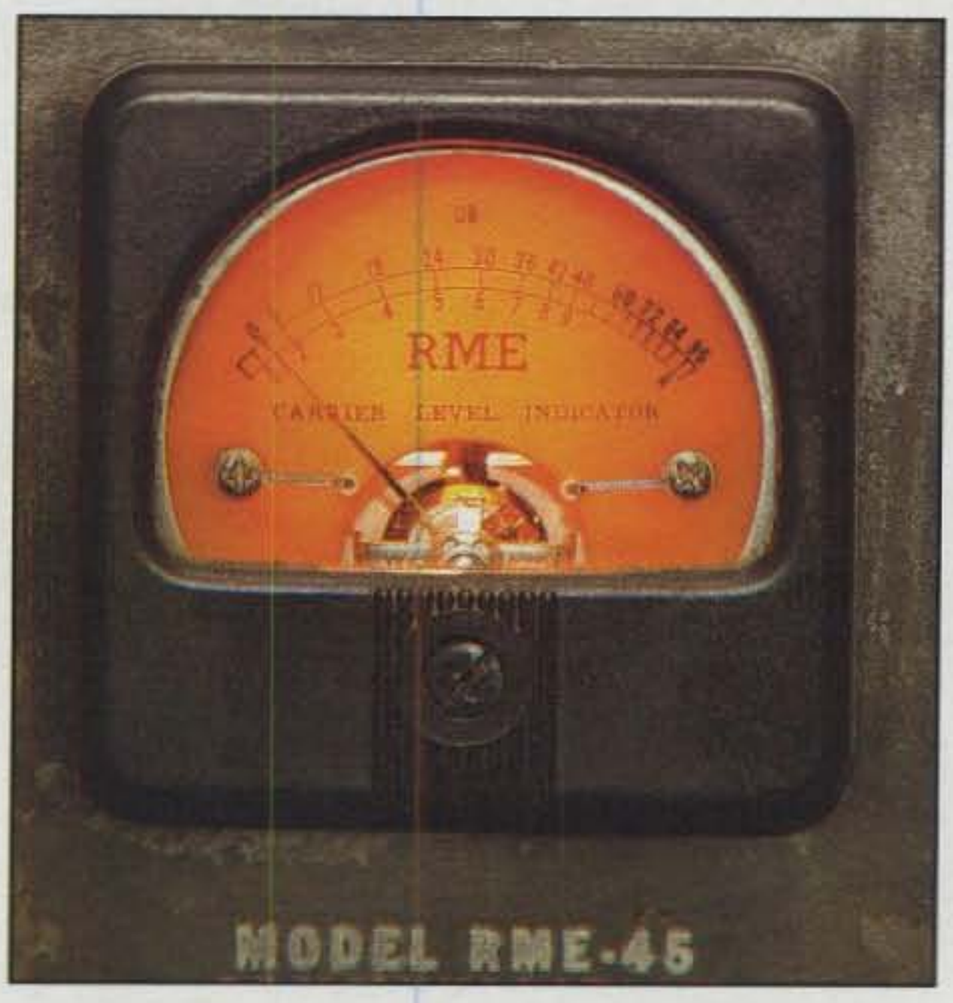
A pair of 12-year-old boys walked home from school talking excitedly about a current event—the launching of the first sputnik satellite. Early in the summer of 2003, one of those same boys writes the words you read now. The 46 years between is not a gap, but a continuum spanned by amateur radio.

It is difficult to write a column about vintage radio equipment without the people of days gone by coming to mind as well. Sometimes the two are tied together directly; often one acts as a trigger mechanism for recalling the other. As I free-associate and browse through my personal memory bank of radio gear and ham pals, perhaps you will enjoy doing so on your own.

The grade school friend in the opening paragraph was Stanley Burns, then KN9KGA, in Wausau, Wisconsin. He dropped the *N*, became a noted contester, and eventually morphed into NØGA. I seem to recall working him when he was in Liberia (EL) years later, too . . . or maybe I was in Liberia and Stan was in Iowa someplace. I forget which. You see? That's just the point. I need a staff following me around taking notes, keeping track of life's minutiae—the things that don't seem important until later when I try to remember them.

My dad is K9NA, a ham since his own adolescence. Growing up with amateur radio gave me a strong push in that direction when choosing my own hobby. Stan's influence, though, came from within my peer group at an age when one seeks to expand beyond the parental domain, to cut apron strings . . . or in this case, coaxial cables. With Stan's help and classes at the Wisconsin Valley Radio Association, coupled with what I learned at home, I soon had a Novice license in hand. I wasn't exactly a double-naught spy, but I *was* KN9OCO.

What magic carpet did I ride to my first airwave adventures? The appropriately named Johnson Adventurer transmitter. Two receivers sat atop my Novice station desk. Number one was my dad's RME-45B, a receiver offering good performance in the tradition of the Radio Manufacturing Engineers company of Peoria, Illinois. The 10-tube set covered .55–33 MHz with calibrated band spread on the ham bands and sold for $198.70 with speaker when new. Except for the voltage regulator and rectifier, all tubes were loctals. It was single-conversion, had a good crystal filter in its 455 kHz IF, and was about my own age. I later discovered my brother Kevin, WB9LNE, and I share a fond sentimentality for the amber glow of the RME-45's S-meter . . . sort of the amateur radio equivalent of the green light at the end of Daisy Buchanan's dock. My backup receiver was a surplus BC-348. The dynamotor had been removed and a 110 VAC power supply inserted in its place by Hugh Weeks, one of my dad's employees. Hugh helped me with my code practice and donated the BC-348 to my Novice station when I received my ticket. Hugh was not a ham, but he *was* a pilot and introduced me to flying, another magic place with its own brotherhood.




*Radio Manufacturing Engineers RME-45 S-meter. (Photos by Joe Veras, N4QB)*

The Adventurer was E. F. Johnson's entry-level transmitter, aimed squarely at the Novice licensee. It was available only in kit form and had no VFO. A 6AG7 crystal oscillator drove an 807 final to 50 watts out, matching unbalanced antennas through a pi-network. Johnson sold the Adventurer from 1954 through 1963. The kit's price grew from $54.95 to $69.95 during its production run.

Upon upgrading to General, instant gratification called in the form of a VFO and a modulator. I cobbled together a screen modulator similar to the one Johnson sold as an accessory for the Adventurer. The need for a VFO was met by assembling a Heathkit VF-1. A modest investment of $19.50, plus time spent following Heath's carefully detailed instructions, bought me frequency agility. It employed a 6AU6 in a series-tuned Colpitts circuit with an OA2 for regulation of the B+. Power for the VFO was obtained from the Adventurer. It covered the 80–10 meter ham bands through frequency multiplication with output on ranges in either the 160 or 40 meter band. It had output on a third range for use on 11 meters, but I didn't operate there then, as I do not now.

*P.O. Box 1041, Birmingham, AL 35201
e-mail: <n4qb@cq-amateur-radio.com>
Photos © Joe Veras

*Left to right, top: Radio Manufacturing Engineers RME-45B receiver, Signal Corps BC-348 receiver, E. F. Johnson Adventurer transmitter; bottom: Heathkit VF-1 VFO, Heathkit DX-40 transmitter, Heathkit AR-3 receiver.*

Even though my amateur career started in Wausau, Green Bay will always be my ham radio hometown. My family moved there in 1958, and I did most of my growing up as an amateur in the city made famous by the Packers. Imagine my surprise upon arriving at my new QTH to discover the kid across the street was also a ham! Your average contester or DXer probably would not even take his stuff out of the moving van, but I knew I had a friend . . . even though I hadn't yet met him. Nels Knutzen, K9QDB, *did* turn out to be a great friend. My life in ham radio would not have been the same without his sense of humor, and I don't recall RF interference causing any problems, even given our proximity. Nels is WØPEC today.

Hams seemed to be everywhere. Even the guy who read the utility meters was a ham. I was in school, but when Louis Pansier, W9LYX, saw the 15 meter Yagi outside and the ham shack in the basement he asked my mom about them. When I came home that afternoon, she told me I had an invitation to Louie's house for an antenna-raising party the following weekend. That's the way it was in Green Bay. I remember always being included as a ham, but don't recall being treated like a kid.

We had a radio club at Franklin Junior High School, but I cannot remember the teacher/advisor's name. He was a ham and the name Doug pops into my head, but I was not on a first-name basis with any teachers . . . at least not until Jane. *That* would be another story, though. Our club sold pastries in the morning before school and showed movies for a small admission charge in the auditorium at lunchtime. The proceeds from these young-capitalist, fund-raising efforts purchased Heathkits we assembled at club meetings. Before the school year was out, Franklin Jr. High had a complete ham station. Besides the DX-40 transmitter and AR-3 receiver, the club built a Q-multiplier and a selection of Heathkit test gear. I was able to enjoy the club station for another year before moving on to West High School.

West had a ham teacher, too, and his name I remember. Also unforgettable are those stern looks he gave me during chemistry class and the fact that he refused to grant an amateur discount when it came to grades or behavior standards. Mr. Greisinger was, and remains, W9PHF. I don't know if he still teaches, but he no longer labors in the halls of my alma mater. Last I heard he was at Green Bay's Southwest High School.

When I graduated West in 1963 and headed for college, I donated my gear to the school's radio club. I was operating sideband by then, after a fashion. My receiver was a National NC-101X with a Central Electronics Model B Sideband Slicer. The transmitter was Central Electronics as well—a 10A paired with a 458 VFO. My start in sideband was double-sideband suppressed-carrier with a homebrew transmitter. The heart of the unit was an ARC-5 surplus unit converted per a March 1957 *CQ* article.[1] Additional ideas from another *CQ* article[2] found their way into the transmitter. As is usually the case with any good homebrew project, some circuit and appearance features were driven by what was on hand in the junkbox at the time of its construction.

Double sideband was simple and relatively inexpensive to implement. Most hams I worked on SSB were never aware of the presence of the other sideband. World Radio Labs produced a commercial double-sideband transmitter, the DSB-100 Sidebander, in 1958 at a price of $119.95 wired and tested or $99.95 in kit form. Power input to the pair of 6DQ6A sweep-tube finals was 100 watts PEP. On the receiving end, DSB can be more difficult to demodulate than SSB. If filters or phasing in the receiver doesn't do an adequate job of eliminating one of the sidebands, proper reinsertion of the carrier is much less forgiving than on SSB.

When I moved to commercial equipment, it was to *single* sideband with the Central Electronics gear mentioned above. The 10A seemed like a giant step up from my homebrew transmitter, and even though my NC-101 was an ancient receiver, the Sideband Slicer helped it do a decent job on the modern mode. The PW dial gave me plenty of band spread and a (vital-to-SSB) slow tuning rate. Leaving the filaments on all the time minimized the drift problem.

Both the transmitter and receiving adapter worked via the phasing principle of SSB generation/reception, a Central

Electronics convention. The transmitter was low-powered (10 watts PEP) and used plug-in coils, but at least now I had a choice of bands. My homebrew DSB transmitter had been a 75-meter-only affair. I was off exploring new worlds, going places my Viking Adventurer could never have taken me.

## The Hams, Then and Now

Blowing the dust from memories of my long-ago ham gear called to mind many other people from my radio past as well. With my curiosity warmed up, I went to a website with a database tool allowing one to sort amateur licensees by community. I used this to see how many hams from the old days were still around. The results of my search satisfied some of my curiosity, raised a couple of questions, and provided a surprise or two.

During part of my misspent youth, I played in a rock band. Our lead guitar player was a guy named Peter Beth, the same person now holding KB9LWI. A phone call to Green Bay satisfied my curiosity, and we spent a few minutes filling in three decades of blank space. Peter told me he had harbored an interest in ham radio as a kid, but that didn't materialize into a license until about eight years ago. He had no idea I was a ham back in our band days, probably because I was so careful to keep those two worlds from colliding. In my mind, it was tough to posture myself as a laid-back rocker while also being the quintessential ham. Well, you've seen the guys at Dayton walking around with the antenna towers on top of their callsign caps; you know what I mean. All this was years before Joe Walsh, WB6ACU, made being a ham while playing in a rock band cool.

I wish now the subject of ham radio had come up during one of those long road trips in our VW van. We might have gotten Peter licensed decades earlier. The unfortunate Williams James incident might never have occurred.

When I began working my first DX in the late 1950s, overseas airmail rates varied depending on the destination rather than the generally uniform system we have today. The number of IRCs required for a return QSL had no set standard either. My guide through this potentially confusing territory was the always smiling W9AHH, a window clerk at Green Bay's main post office. Russ Mott may have tired of my enthusiastic tales of late-night DXing . . . I know the people behind me in line did . . . but, in his patient way, he never showed it. He welcomed me into his shack on many occasions, too. Our conversations there could go on at length without threatening to violate the famous U.S. Postal Service motto.

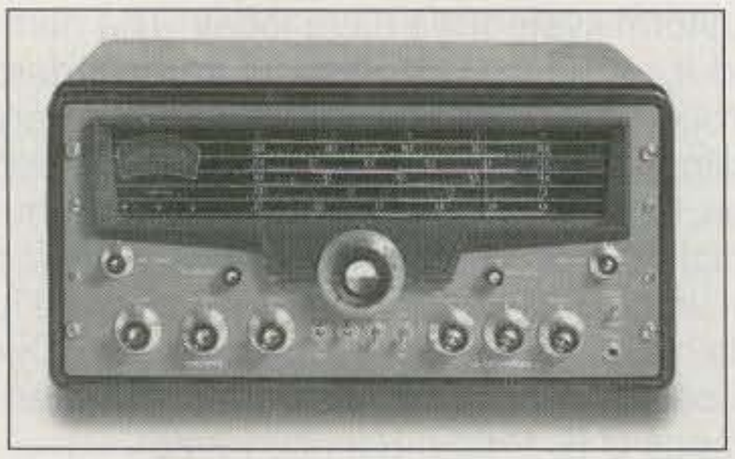
Not every cast member from the story of my Novice and young-ham days is spoken of in the past tense. Regular readers of this column will remember my mentioning Chris, K9JQE. Our friendship goes back to my earliest days as an amateur; it is as persistent and long-lived as my interest in the hobby. Over the years we have managed to stay in touch, have a few QSOs, and without fail meet for a little eyeball-to-eyeball contact every year at Dayton. Chris owned the first piece of all-solid-state ham gear I saw—the Regency ATC-1 mobile converter.

A ham I didn't know when I lived in Green Bay but came to appreciate through many QSOs after I moved is Dale Johnson, WB9NRK. Dale represents that best part of amateur radio most of us know about but few practice—selfless generosity in assistance to others.

The call WB9GAA has attached to it a name and memories from another of my longtime hobbies. In the mid-1960s I purchased a BMW motorcycle from a shop owned by the Le Mieux family. It seemed as if several generations of the family worked there, and one of the shop's ace mechanics was a young man named Jules, the same as the current holder of the WB9GAA license. Could it be one and the same? I have absolutely no idea, but the age would be about right according to birthday info on file with the FCC. For now, it will be a ham radio mystery for me.

KD9MM is another of the new-to-me calls on the list of Green Bay area hams. Randy and I were acquainted in a

*Left to right, top: National NC-101X receiver, Central Electronics Model B Sideband Slicer, Central Electronics 10A transmitter; bottom: Central Electronics 458 VFO, World Radio Labs DSB-100 Sidebander double-sideband transmitter, Johnson Viking Ranger transmitter.*



*The Hallicrafters SX-101 receiver.*

context outside ham radio—could have come close to being related by marriage or something at one time. I suppose not everyone wants a ham for a brother-in-law, though. Way in the back of the room a hand is raised in exception. It is Doug Grant, K1DG.

Okay, let's say you're Doug and you're looking to partner with another great op in contests. Polishing your courtship skills to the point where you are able to talk the sister of K1AR's wife into marrying you isn't exactly the *dumbest* thing anybody ever did! In high society, it is termed Marrying Well.

Except for the occasional comparative reference to Siberia (by outsiders), Green Bay of those days had little of the exotic about it. We *did* have resident DX. I remember bicycling (not for health or environmental reasons; this is how 13-year-olds got around) over to the Howard Street QTH of Antonio Cruz-Uribe, XE1BT, and his wife, Lillian, W9MMO. Tony taught me to call CQ and give signal reports in Spanish, not immediately useful on the Novice bands in Green Bay, but most acquired skills come in handy eventually. Tony and Lillian were gracious hosts who disseminated amateur radio tradition to the next generation in the finest way possible—by example.

A few Hamventions® ago I glanced up from the box of 50-year-old radio parts I was digging through to find myself looking at a couple of faces I hadn't seen in more than 30 years. At first I thought Todd and Tom were apparitions brought on by the sleep deprivation that always accompanies the Dayton marathon, or a sign I had gone over my three-hotdog limit at lunch. As they walked through the flea market toward me, each step closer made me more certain these were the adult versions of two junior high and high school ham pals. Their callsign badges didn't help in the identification process, but then my own call has changed several times over the years. Unable to think of the amateur radio protocol for dealing with this social situation, I stepped away from the parts boxes to greet them with names, not callsigns, addressing them tentatively as Todd and Tom. Turns out I was right! They actually *were* my buddies from school.

A mini-reunion and a small hamfest-within-a-hamfest formed on the spot. Both still live in Green Bay, and they came down to Dayton together. All of us shared the common experience of college, career, and family punching holes in our ham tickets. The common bond we felt with the hobby returned us to the fold when time and other obligations permitted; it brought the three of us to this place in mid-Ohio, too.

Tom, currently signing N9WI, was KN9ZLZ back when I was KN9OCO. That has a certain symmetry to it I had never noticed before. Tom had one of the coolest Novice stations imaginable. Soon after he passed his exam, Tom's parents drove us to the original Milwaukee location of Amateur Electronics Supply. The Prust's Oldsmobile returned to Green Bay with a Johnson Viking Ranger and Hallicrafters SX-101 in the trunk. In those days, the *AES* Lisbon Avenue location was the ultimate candy store. Terry and the gang stocked every conceivable piece of new ham gear and had more used equipment on hand than I have ever seen anywhere else. The visit was a real treat for a pair of wide-eyed teens.

Todd, now KE9PW, tells me he doesn't work much CW these days. In fact, following that meeting at the Hamvention® our only contacts have been on 20 meter SSB . . . strange for a guy who could do 35 wpm tapping a pencil in high school. I know youngsters out there sharing test answers, exchanging gossip, or browsing the net in the classroom via 802.11b linked PDAs are snickering, but hey . . . this was the early 1960s! We did what we could with our pencil-telegraph system.

Time flies. I've been *Just Another Four* the majority of my amateur career, 29 out of 46 years in ham radio. Roots have grown, strong bonds and wonderful friendships formed here in Alabama. I already feel the keen, cutting sense of loss when one of my new friends is taken away after what seems too short a time. That is why I embrace the memory of the days gone by with the same passion I exercise in collecting old radios. It is my way of honoring absent friends, whether they are the vacuum-tube or flesh-and-blood variety.

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With your help, this edition of "Radio Classics" continues beyond these magazine pages. I've been able to keep track of, or stay in contact with, several of the people mentioned. The whereabouts and status of some others are best guesses and surmises. In a few cases, I have *no* idea. If you have better, current information, please contact me here at *CQ*, through my callbook address, or via e-mail: <n4qb@jveras.com>. I'm also interested in the equipment you readers used early in your ham careers, whether you started half-a-century ago or recently. I have a survey questionnaire on my website with spaces to fill in the type of gear and room to add comments. The site is <http://www.n4qb.com>; a report on the survey will appear in this column the next time around. The form may be found by going to page 2 of the site, clicking on the radio button, and then following the link on the Radio Page. I'm looking forward to hearing from you.

73, Joe, N4QB

## Notes


1. Najork, Jack, W2NNH. "A 100 Watt DSB Mobile Transmitter," *CQ*, March 1957, pp. 52–57.

2. Fenner, Richard G., W5AVI. "Another Approach to DSB Conversion of Command Transmitters," *CQ*, February 1960, pp. 50–52.



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BY CARL SMITH,* N4AA

# DXpedition Issues

Well now, the summertime propagation certainly hasn't been anything to brag about. The higher HF bands have yielded little, and the old standby, 20 meters, has been the mainstay for many as the 11-year sunspot cycle continues its downward trend. Somewhat surprising, at least to me, has been the DX reported on 160 and 80 meters. Typically, the summer static levels don't allow much in the way of DX, but a lot of DX is being worked on these bands this year. Also, 6 meters has been very active, probably due to a lot of DXers wanting to add to their totals for the DXCC Challenge Award. Once they have worked all there is on the HF bands, they are turning to 6 meters to build totals and having very good success, too. Are you on 6 meters yet? It can be a lot of fun and very rewarding, even with simple antennas.

## DXpeditions: Cost, Funding, and QSLing

I'm going to raise a couple of issues this month that have been talked about on the internet reflectors this summer. First is the cost of DXpeditioning and the funding for those activities. Many of the DXpeditions in recent years have taken on the look of "only for the very rich." The cost associated with some of these trips is astronomical. Even with large groups of operators paying their "fair share," they still ask for donations and solicit large sums of money from DX clubs, foundations, etc., to offset the cost of transportation and other expenses. Many in the DX community are beginning to question the necessity of "donations" from the "public" for operations from less than very rare locations.

What constitutes a "very rare" location? Well, I suppose that depends on your individual situation. Do you need North Cook for an all-time new one, or do you just need it for a few bands/modes? Most Wanted surveys are conducted annually by *The DX Magazine, 425 DX News,* and others. These usually include the top 100, and the one from *The DX Magazine* also gives the top 50 by mode and breaks down the lists by the various areas of the world and North American time zones. At least some of the leading DX foundations use these Most Wanted surveys to determine to whom they allocate funds and how much they provide. I don't know the specific criteria, but I do know they use the surveys.

This brings me to my point. In years gone by, DXpeditions were undertaken by groups who rarely, if ever, made public requests for funds to make the trip. At least I don't recall it being done 15 or 20 years ago, or if they did, it wasn't to the extent it is being done today. Has the "almighty dollar" become so important that a DXpedition cannot be undertaken without the DX community coming forward with thousands of dollars to make it happen, even to entities that are in the lower ranges of those Most Wanted surveys? There are those who have the "political" contacts to be able to go places that others cannot, and they may lack the personal finances to "make it happen." In those cases, there are organizations (DX foundations and DX clubs) that do have the funds available to assist them. Consider the Micro-Lite DXpedition to South Sandwich and South Georgia. That team made it happen with little financial aid, and they did a super job of making those two rare locations available. No, they didn't have a rock-crushing signal with their 100 watt radios, but with the operating skill of experienced operators, they did a very credible job.

With the world economic situation today, there are fewer dollars available for the average DXer.

*P.O. Box DX, Leicester, NC 28748-0249
e-mail: <n4aa@cq-amateur-radio.com>

*Jim, 9K2/KB2DQE, operating from a tent in the Kuwaiti desert. He has a TS-50, Hallicrafters mobile antenna tuner, and a 40 meter dipole up about 30 feet as an inverted-Vee. He said the desert winds cause static charges, and he is trying to "find" a ground with a 9 foot piece of rebar driven into the ground. Look for him on 14240 kHz around 2000Z most nights with K1QS, WA2JUN, 9K2MU, and others. He reports that most of the time he is readable 5×5 into the states. (Photo courtesy Jim, KB2DQE)*

## The WPX Program

### CW

3115.....JA6GWU

### SSB

2868.....EA8RR  2870.....W9JOE
2869.....PY1LJ  2871.....JA6GWU

### Mixed

1922.....KW1DX  1923.....IZ0BXZ

**CW:** 650 JH8WGT. 850 IV3DYS. 1100 WA2VQV. 1500 AK7O.

**SSB:** 350 PY1LJ, W9JOE. 800 IZ0BNR, SM7GXR. 1100 EA8RR. 1200 AG4W. 3900 K9QVB.

**MIXED:** 450 IZ0BXZ. 750 IK2RPK. 950 SM7GXR. 1700 WZ4P. 1750 K0KG, JA6GWU. 2050 IK3GER.

**10 Meters:** EA8RR, PY1LJ
**15 Meters:** EA8RR, SM7GXR
**20 Meters:** EA8RR, AG4W, SM7GXR
**40 Meters:** SM7GXR
**80 Meters:** EA8RR, AG4W, SM7GXR
**160 Meters:** SM7GXR

**Asia:** SM7GXR
**Africa:** EA8RR, HB9DOT
**N. America:** EA8RR, HB9DOT, SM7GXR
**S. America:** EA8RR
**Europe:** EA8RR, PY1LJ, SM7GXR

**Award of Excellence Holders:** N4MM, W4CRW, K5UR, K2VV, VE3XN, DL1MD, DJ7CX, DL3RK, WB4SIJ, DL7AA, ON4QX, 9A2AA, OK3EA, OK1MP, N4NO, ZL3GQ, W4BQY, I0JX, WA1JMP, K0JN, W4VQ, KF2O, W8CNL, W1JR, F9RM, W5UR, CT1FL, WA4QMQ, W8ILC, VE7DP, K9BG, W1CU, G4BUE, N3ED, LU3YL/W4, NN4Q, KA3A, VE7WJ, VE7IG, N2AC, W9NUF, N4NX, SM0DJZ, DK5AD, WD9IIC, W3ARK, LA7JO, VK4SS, I8YRK, SM0AJU, N5TV, W6OUL, WB8ZRL, WA8YM, SM6DHU, N4KE, I2UIY, I4EAT, VK9NS, DE0DXM, DK4SY, UR2QD, AB0P, FM5WD, I2DMK, SM6CST, VE1NG, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, HA8XX, K7LJ, SM3EVR, K2SHZ, UP1BZZ, EA7OH, K2POF, DJ4XA, IT9TQH, K2POA, N6JV, W2HG, ONL-4003, W5AWT, KB0G, HB9CSA, F6BVB, YU7SF, DF1SD, K7CU, I1PO, K9LNJ, YB0TK, K9QFR, 9A2NA, W4UW, NX0I, WB4RUA, I6DQE, I1EEW, I8RFD, I3CRW, VE3MC, NE4F, KC8PG, F1HWB, ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, KC7EM, YU1AB, IK2ILH, DE0DAQ, I1WXY, LU1DOW, N1IR, IV4GME, VE9RJ, WX3N, HB9AUT, KC6X, N6IBP, W5ODD, I0RIZ, I2MQP, F6HMJ, HB9DDZ, W0ULU, K9XR, JA0SU, I5ZJK, I2EOW, IK2MRZ, KS4S, KA1CLV, KZ1R, CT4UW, K0IFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, OE1EMN, W9IL, S53EO, DF7GK, I7PXV, S57J, EA8BM, DL1EY, K0DEQ, KU0A, DJ1YH, OE6CLD, VR2UW, 9A9R, UA0FZ, DJ3JSW, HB9BIN, N1KC, SM5DAC, RW9SG, WA3GNW, S51U, W4MS, I2EAY, RA0FU, CT4NH, EA7TV, W9IAL, LY3BA, K1NU, W1TE, UA3AP, EA5AT, OK1DWC, KX1A, IZ5BAM, W4GP, K4LQ, K0KG, DL6ATM, VE9FX.

**160 Meter Endorsement:** N4MM, W4CRW, K5UR, VE3XN, DL3RK, OK1MP, N4NO, W4BQY, W4VQ, KF2O, W8CNL, W1JR, W5UR, W8RSW, W8ILC, G4BUE, LU3YL/W4, NN4Q, VE7WJ, VE7IG, W9NUF N4NX, SM0DJZ, DK3AD, W3ARK, LA7JO, SM0AJU, N5TV, W6OUL, N4KE, I2UIY, I4EAT, VK9NS, DE0DXM, UR1QD, AB9O, FM5WD, SM6CST, I1JQJ, PY2DBU, HI8LC, KA5W, K3UA, K7LJ, SM3EVR, UP1BZZ, K2POF, IT9TQH, N8JV, ONL-4003, W5AWT, KB0G, F6BVB, YU7SF, DF1SD, K7CU, I1POR, YB0TK, K9QFR, W4UW, NX0I, WB4RUA, I1EEW ZP5JCY, KA5RNH, IV3PVD, CT1YH, ZS6EZ, YU1AB, IK4GME, WX3N, WB0DD, I0RIZ, I2MQP, F6HMJ, HB9DDZ, K9XR, JA0SU, I5ZJK, I2EOW, KS4S, KA5CLV, K0IFL, WT3W, IN3NJB, S50A, IK1GPG, AA6WJ, W3AP, S53EO, S57J, DL1EY, K0DEQ, DJ1YH, OE6CLE, HB9BIN, N1KC, SM5DAC, S51U, RA0FU, UA0FZ, CT4NH, W1CU, EA7TV, LY3BA, RW9SG, K1NU, W1TE, UA3AP, OK1DWC, KX1A, IZ5BAM, W4GP, DL6ATM.

Complete rules and application forms may be obtained by sending a business-size, self-addressed, stamped envelope (foreign stations send extra postage if airmail desired) to "CQ WPX Awards," P.O. Box 593, Clovis, NM 88101 USA. ***NOTE:*** *WPX will not accept prefixes/calls which have been confirmed by computer-generated electronic means.*

## 5 Band WAZ

**As of July 15, 2003, 629 stations have attained the 200 zone level and 1339 stations have attained the 150 zone level.**

**New recipients of 5 Band WAZ with all 200 zones confirmed:**

N0AT  EA4GT

**The top contenders for 5 Band WAZ (zones needed, 80 meters):**

N4WW, 199 (26)
W4LI, 199 (26)
K7UR, 199 (34)
W0PGI, 199 (26)
W2YY, 199 (26)
VE7AHA, 199 (34)
IK8BQE, 199 (31)
JA2IVK, 199 (34 on 40m)
KL7Y, 199 (34)
NN7X, 199 (34)
IK1AOD, 199 (1)
DF3CB, 199 (1)
KC7V, 199 (34)
GM3YOR, 199 (31)
VO1FB, 199 (19)
KZ4V, 199 (26)
W6DN, 199 (17)
W6SR, 199 (37)
W3NO, 199 (26)
K4UTE, 199 (18)
HB9DDZ, 199 (31)
RU3FM, 199 (1)
HB9BGV, 199 (31)
N3UN, 199 (18)
OH2VZ, 199 (31)
K5MC, 199 (22)
W1JZ, 199 (24)
K2UU, 199 (26)
W1WAI, 199 (24)
W1FZ, 199 (26)
SM7BIP, 199 (31)
PY5EG, 199 (23)
SP5DVP, 199 (31 on 40)
KY7M, 199 (34)
W8AEF, 199 (40)
K8RR, 199 (26)
UU5JR, 199 (4)
W8GF, 199 (22)
N4NX, 199 (26)
OE2BZL, 199 (1)
EA5BCX, 198 (27, 39)
G3KDB, 198 (1, 12)
KG9N, 198 (18, 22)
UA4PO, 198 (1, 2)
JA1DM, 198 (2, 40)
9A5I, 198 (1, 16)
K5PC, 198 (18, 23)
K4CN, 198 (23, 26)
KF2O, 198 (24, 26)
G3KMQ, 198 (1, 27)
N2QT, 198 (23, 24)
OK1DWC, 198 (6, 31)
W4UM, 198 (18, 23)
US7MM,198 (2, 6)
K2TK, 198 (23, 24)
K3JGJ, 198 (24, 26)
W4DC, 198 (24, 26)
N4XR, 198 (22, 27)
N4PQX, 198 (24, 26)
RU3DX, 198 (1, 6)
UT5JAJ, 198 (12, 30)
N6HR/7, 198 (34, 37)
N4MM, 198 (24, 26)

**The following have qualified for the basic 5 Band WAZ Award:**

K5EV (150 zones)
WQ5W (190 zones)
7K3QPL (154 zones)
K1BD (179 zones)
K4QL (195 zones)

**Endorsements:**

K6YUI (192 zones)
DL1SP (190 zones)
KJ0M (200 zones)
N8PR (200 zones)
WO2N (184 zones)
F6CPO (200 zones)

****Please note: Cost of the 5 Band WAZ Plaque is $80 ($100 if airmail shipping is requested).**

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Paul Blumhardt, K5RT, 2805 Toler Road, Rowlett, TX 75089. The processing fee for the 5BWAZ award is $10.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $15.00 for nonsubscribers. An endorsement fee of $2.00 for subscribers and $5.00 for nonsubscribers is charged for each additional 10 zones confirmed. Please make all checks payable to Paul Blumhardt. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. K5RT may also be reached via e-mail: <k5rt@cq-amateur-radio.com>.


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*Fabian, LU2OF, not only has a great-looking radio room, he also has an outstanding view from the nearby window. Look for him on 80, 40, 20, and 10 meters. He also enjoys the amateur satellites. (Photo courtesy John, KD0JL)*

Just look at the cost of direct QSLing today compared to what it was five years ago. It can cost a fortune for the beginning DXer to QSL direct to try to get those cards needed as he or she works to build confirmed totals. Even after a DXer has obtained good equipment and antennas to effectively chase DX, the cost doesn't stop. If there are family obligations, the funds to sustain the hobby become even less available.

DXpeditions will go on, rare locations will still be activated, and DXpeditioners will continue to find the funds necessary to make it happen. I just believe it's time for everyone to give serious thought to the financial implications when planning these trips. I'm not advocating a boycott of funding, by any means. I'm only throwing this out for your thought and consideration.

Along with DXpeditioning are the QSL cards. I wonder just how important it is to have those double, full-color cards that seem to take months and months


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*Miika, OH2BAD, is a young man with a love for amateur radio. He is president of Finland's OHDXF and was a member of Finland's 2002 WRTC team. He has also operated contests from OH2AQ, OHØW, EA8CR, and PJ9W. (Photo courtesy John, KDØJL)*

*Henry, LU4DXC, José Luis, LU1ZA, and Rick, LU/NE8Z, shown here at Henry's home last spring. Rick was visiting and discovered that José Luis had just returned to Buenos Aires three days before this photo was taken. He had been at the South Orkney Base for 13 months, 20 days, and 10 hours according to José Luis. (Photo courtesy Rick, NE8Z)*

## The WAZ Program

### 20 Meter SSB
1114 ..... KA4RRU

### 12 Meter CW
41 ..... N7WO

### 15 Meter CW
312 ..... K6YUI

### 20 Meter CW
535 ..... 7K3QPL

### 40 Meter CW
235 ..... N1NK

### 6 Meters
61 ..... K9AB (26 zones)
62 ..... W2MPK (25 zones)

### 160 Meters
184 ..... K4QL (34 zones)

### All Band WAZ SSB
4872 ..... DL8MG  4873 ..... W2OO

### Mixed
8243 ..... DL2ASB  8246 ..... SP3JUN
8244 ..... DS5ISO  8247 ..... JQ2GYU
8245 ..... JA7MN

### All CW
373 ..... KB5NJD  375 ..... WQ5W
374 ..... N5UW  376 ..... DL7USY

### RTTY
140 ..... VE2EH  141 ..... DL1SP

Rules and applications for the WAZ program may be obtained by sending a large SAE with two units of postage or an address label and $1.00 to: WAZ Award Manager, Paul Blumhardt, K5RT, 2805 Toler Road, Rowlett, TX 75089. The processing fee for all *CQ* awards is $6.00 for subscribers (please include your most recent *CQ* mailing label or a copy) and $12.00 for nonsubscribers. Please make all checks payable to Paul Blumhardt. Applicants sending QSL cards to a *CQ* checkpoint or the Award Manager must include return postage. K5RT may also be reached via e-mail: <k5rt@cq-amateur-radio.com>.

to have printed and finally distributed? Oh yes, they are pretty to look at—at least for the first 15 minutes after we get them—but then where to they go? Are they filed in a book, a drawer, or a shoebox? Sure, often someone, somewhere donates many of these cards, and there is little, if any, cost to the DXpedition, but that's not always the case. How about you? What do you think about the DXpedition QSL issue?

Another topic mentioned recently by one of the my readers of was also related to QSLing. From a group of DXers came the idea of DXpeditions appointing QSL Managers in the three major ham population centers (U.S., Europe, and Japan). With the increasing cost of postage in almost every country in the world, it would certainly be an excellent public-relations point for DXpeditions to consider. Also, it could minimize the theft of mail we hear about all too often these days. The shorter the route, the less opportunity for theft of your precious dollars or IRCs. Major DXpeditions have continental Pilot Stations to assist them during the operation. Why not have regional QSL Managers?

We all can look forward to the activation of the Logbook of the World system to solve some of the QSLing problems. If DXpeditions use the system, it will significantly improve the acceptance for


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## CQ DX Honor Roll

The CQ DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more ACTIVE countries. With few exceptions, the ARRL DXCC Countries List is used as the country standard. The CQ DX Award currently recognizes 335 countries. Honor Roll listing is automatic when an application is received and approved for 275 or more active countries. Deleted countries do not count and all totals are adjusted as deletions occur. To remain on the CQ DX Honor Roll, annual updates are required. All updates must be accompanied by an SASE if confirmation of total is required. The fee for endorsement stickers is $1.00 each plus SASE. Please make checks payable to the awards manager, Billy F. Williams. All updates should be mailed to P.O. Box 9673, Jacksonville, FL 32208.

### CW

K2TQC.....334
K2FL.....334
K9BWQ.....334
K9MM.....334
W7OM.....334
K2JLA.....334
N7FU.....334
K2OWE.....334
N4MM.....334
F3TH.....334
F3AT.....334
DJ2PJ.....334
WA4IUM.....334
W4OEL.....334
W2FXA.....334
N4JF.....334
K4MQG.....334
EA2IA.....334
PA5PQ.....334
K3UA.....334
DL3DXX.....334
K2ENT.....333
WB5MTV.....333
W7CNL.....333
YU1HA.....333
IT9QDS.....333
G4BWP.....333
K4CEB.....333
K4IQJ.....333
W0HZ.....333
N5FG.....333
N7RO.....333
K4CN.....333
W4MPY.....333
PY2YP.....333
K6GJ.....332
KA7T.....332
W8XD.....332
W0JLC.....332
K8LJG.....332
YU1AB.....332
K5RT.....332
N0FW.....332
N4AH.....332
K6LEB.....331
VE3XN.....331
W1WAI.....331
K2JF.....331
K3JGJ.....331
PT2TF.....331
W2VJN.....331
N4CH.....331
W2UE.....330
I4LCK.....330
VE7CNE.....330
4N7ZZ.....330
W6DN.....330
K7LAY.....330
WB4UBD.....330
G3KMQ.....329
KZ4V.....329
N5HB.....329
W4UW.....329
K1HDO.....328
K7JS.....328
K9OW.....328
K9IW.....328
K8PV.....327
W4QB.....327
I1JQJ.....327
YU1TR.....327
I4EAT.....327
DL8CM.....327
SM6CST.....327
N4KG.....327
K4JLD.....327
IT9TQH.....326
I2EOW.....326
NC9T.....326
W7IIT.....326
W4LI.....325
OK1MP.....325
WA8DXA.....325
I5XIM.....325
K5UO.....325
IK2ILH.....325
N5FW.....325
9A2AA.....325
N4OT.....325
LA7JO.....324
SM5HV/HK7.....324
9A2AJ.....323
W6SR.....323
K1FK.....323
KU0S.....322
KE5PO.....322
K6CU.....321
HA5DA.....321
IK0TUG.....321
VE7DX.....320
IK0ADY.....320
WG5G/QRPp.....320
HA5NK.....319
F6HMJ.....319
N7WO.....318
G3KMQ.....317
OZ5UR.....317
F5OIU.....317
YT1AT.....317
K8JJC.....315
HB9DDZ.....314
CT1YH.....313
PY4WS.....313
N1HN.....313
K9DDO.....312
W3II.....312
W6YQ.....311
KF8UN.....308
IK0ADY.....307
YU7FW.....306
LU3DSI.....302
F5OIU.....302
N1KC.....302
KH6CF.....301
VE7KDU.....300
W9IL.....300
K0HQW.....299
WG7A.....295
KE3A.....295
K4IE.....291
KD8IW.....288
EA3BHK.....282
YC2OK.....282
DJ1YH.....281
UA9SG.....279
XE1MD.....278
EA2CIN.....278
I3ZSX.....276
G3DPX.....275
WA4DOU.....275

### SSB

K6YRA.....335
K2TQC.....335
W6EUF.....335
K2JLA.....335
K4MQG.....335
IK1GPG.....335
K5OVC.....335
N0FW.....335
K9MM.....335
W6BCQ.....335
XE1AE.....335
W7OM.....335
KZ2P.....335
IK8CNT.....335
VK4LC.....335
OE7SEL.....335
VE3MR.....335
VE3MRS.....335
K4MZU.....335
OZ5EV.....335
N7BK.....335
K7LAY.....335
ZL3NS.....335
N4MM.....335
OZ3SK.....335
K7JS.....335
XE1L.....335
YU1AB.....335
OE3WWB.....335
K5TVC.....335
N5FG.....335
DJ9ZB.....335
PY4OY.....335
VE3XN.....335
4Z4DX.....335
N7RO.....335
I0ZV.....335
EA2IA.....335
IN3DEI.....335
EA4DO.....335
PA5PQ.....335
K9OW.....335
W6DPD.....335
XE1VIC.....335
IZ6GPZ.....335
WD0BNC.....334
DU9RG.....334
K2FL.....334
W0YDB.....334
W4UW.....334
K9BWQ.....334
W4NKI.....334
WB4UBD.....334
W4UNP.....334
W8AXI.....334
VE2GHZ.....334
OE2EGL.....334
WA4IUM.....334
K5RT.....334
W2FXA.....334
N4JF.....334
W6SHY.....334
W5RUK.....334
K4CN.....334
EA3KB.....334
N4CH.....334
K3UA.....334
K4JLD.....334
N5ZM.....334
PY2YP.....334
AA4S.....334
K2ENT.....333
4N7ZZ.....333
KE5PO.....333
VE1YX.....333
I4LCK.....333
W2JZK.....333
K8LJG.....333
VE4ACY.....333
K0KG.....333
W4WX.....333
VE2WY.....333
WB3DNA.....333
K6GJ.....333
W9SS.....333
K9PP.....333
W2CC.....333
VE7WJ.....333
W3AZD.....333
DL3DXX.....333
VE2PJ.....332
YV1KZ.....332
YV1AJ.....332
KS0Z.....332
I8KCI.....332
LU4DXU.....332
VE4ROY.....332
W7FP.....332
K9HQM.....332
CT1EEB.....332
K1UO.....332
EA3BMT.....332
W2FKF.....332
DL9OH.....331
N2VW.....331
YZ7AA.....331
YV1JV.....331
WA4WTG.....331
W8KS.....331
YV5IVB.....331
KX5V.....331
I8LEL.....331
K3JGJ.....331
N5ORT.....331
PT2TF.....331
CT1AHU.....331
EA3JL.....331
W6DN.....330
K8CSG.....330
YV1CLM.....330
LA7JO.....330
AB4IQ.....330
AE5DX.....330
KB2MY.....330
K3PT.....330
WS9V.....329
K2JF.....329
ZL1AGO.....329
N5FG.....329
W9OKL.....329
DU1KT.....329
I2EOW.....329
VE7DX.....329
W2FGY.....329
CT1EEN.....329
KE4VU.....328
K1HDO.....328
K5UO.....328
KF8UN.....328
EA3EQT.....328
W0ULU.....328
K1EY.....328
KZ4V.....328
XE1D.....328
KD8IW.....328
ZL1BOQ.....328
KE3A.....328
W9IL.....328
KE3A.....328
K3LC.....328
I1EEW.....327
SV1ADG.....327
DL8CM.....327
F9RM.....327
XE1MD.....327
I4EAT.....327
W3GG.....327
AA6BB.....327
SM6CST.....327
WD8MGQ.....327
CX4HS.....327
I0SGF.....327
IT9TQH.....327
IT9TGO.....327
DK5WQ.....327
UY5XE.....327
KW7J.....327
KE5K.....327
I1JQJ.....327
CP2DL.....327
NI5D.....327
W6SR.....326
N4KG.....326
K7TCL.....326
W9HRQ.....326
W4QB.....326
K8PV.....326
DL6KG.....326
W4LI.....326
WR5Y.....326
W5LLU.....326
N1ALR.....326
K9IW.....326
WA4JTI.....325
KC4MJ.....325
PY2DBU.....325
IK0IOL.....325
EA1JG.....325
YT1AT.....325
K7HG.....324
AC7DX.....324
K0HQW.....324
EA3BKI.....323
K4JDJ.....323
EA3BMT.....323
W6WI.....323
F6BFI.....322
K6CF.....322
K6CF.....322
LU7HJM.....322
K5NP.....322
WA4ZZ.....322
WN9NBT.....322
LU5DV.....322
WW1N.....322
N3RX.....321
XE1CI.....321
CT1ESO.....321
EA8TE.....321
W6MFC.....321
N4CSF.....320
N4HK.....320
DL3DXX.....320
K0FP.....320
EA7TV.....320
SV1RK.....320
N1KC.....320
WA4DAN.....319
CE1YI.....318
W5OXA.....317
YV4VN.....317
EA5GMB.....317
KD5ZD.....317
K6RO.....316
N5HSF.....316
N8SHZ.....316
KE4SCY.....315
WZ3E.....314
IZ6CST.....314
K9YY.....313
N0MI.....313
W5GZI.....311
VE3CKP.....311
CT1YH.....311
YV5NWG.....311
LU3HBO.....310
SV3AQR.....310
HA6NF.....310
HB9DDZ.....310
WA5MLT.....310
XE2LV.....310
EA3BHK.....307
RW9SG.....307
XE1MDX.....305
EA5OL.....305
WB2AQC.....305
EA3CYM.....304
KC4FW.....304
K3BYV.....303
YC2OK.....303
WB2NQT.....303
VK3IR.....303
VE7KDU.....302
W2GZI.....302
N5QDE.....302
KD4YT.....302
KK4TR.....301
VE7SMP.....301
SV2CWY.....300
4X6DK.....300
YT7TY.....300
XE2NLD.....300
K4IE.....300
K6GFJ.....299
AC6WO.....297
WA1ECF.....295
N5WYR.....293
K7ZM.....292
OA4EI.....292
K7ZM.....292
K0OZ.....291
W4PGC.....290
I3ZSX.....290
YV5NWG.....287
VE7HAM.....285
KK0DX.....285
F5RRS.....284
CT1CFH.....284
F5RRS.....284
N8LIQ.....284
W0IKD.....283
W9ACE.....283
KB0RNC.....282
WN6J.....281
IK8TMI.....281
F5JSK.....281
KK5UY.....280
YU1TR.....280
KA5OER.....280
F5INJ.....279
EA3CWT.....278
VE2DRN.....277
9A9R.....277
W6UPI.....276
Z31JA.....275
G4URW.....275
VE2AJT.....275
4Z5FL/M.....275

### RTTY

K2ENT.....331
WB4UBD.....329
NI4H.....325
EA5FKI.....320
K3UA.....320
W2JGR.....316
G4BWP.....312
PA5PQ.....311
N5FG.....305
KE5PO.....297
W4EEU.....293
I2EOW.....291
I1JQJ.....289
W4QB.....280
YC2OK.....280

DXCC credits, even without that piece of paper. Let the paper come eventually. At least you can have credit for the contact in a timely manner.

## Here and There

Just a few short years ago a contact with Afghanistan was worth a lot. Today we regularly hear YA stations. The same is now true of Iraq. Although there was some activity from the YI1BGD club station, there was not nearly enough to meet the demand. Most of the current activity is from U.S. military personnel operating with relatively low power and simple antennas, but there are a number of them on the air, and they are workable on several bands.

The so-called "low bands" of 160 and 80 will see increased activity over the

*Dimitris, SV1EQD, uses a TS-50 into a vertical on 10 meters SSB. here you can also see his other hobby—collecting military radio equipment. (Photo courtesy John, KD0JL)*

## CQ DX Awards Program

### SSB

2409.....AA4S  2410.....WØRC

### CW

1049.....N2LM  1051.....NØTNJ
1050.....4Z5CX

### SSB Endorsements

320.....AA4S/334  300.....VE7SMP/301
320.....DL3DXX/333  275.....AC6WO/297
320.....YT1AT/325  200.....N2LM/216

### CW Endorsements

320.....DL3DXX/334  200.....4Z5CX/207
310.....YT1AT/317

The basic award fee for subscribers to *CQ* is $6. For non-subscribers, it is $12. In order to qualify for the reduced subscriber rate, please enclose your latest *CQ* mailing label with your application. Endorsement stickers are $1.00 each plus SASE. Updates not involving the issuance of a sticker are free. Rules and application forms for the CQ DX Awards Program may be obtained by sending a business-size, No. 10, self-addressed, stamped envelope to CQ DX Awards Manager, Billy Williams, N4UF, Box 9673, Jacksonville, FL 32208 U.S.A. Currently we recognize 335 active countries. Please make all checks payable to the award manager.

## QSL Information

**3ØGA** via N2OO
**ED1ONS** via ED4URJ
**EL2/K4ZLE** via K4ZLE
**EL2LE** via K4ZLE
**EN3WLL** via UR4WXQ
**EN4ØQPG** via UY5YY
**EN72ØK** via IK1GPG
**EO58C** via UT7CWW
**EO58E** via UR7EP
**EO58HK** via UT1HZM
**EO58I** via UR6IM
**EO58IM** via UX8IXX
**EO58IS** via US7IGF
**EO58JM** via KG6AR
**EO58JM** via KG6AR
**EO58JS** via UU9JWI
**EO58L** via UR4LXB
**EO58M** via UR4MWZ
**EO58X** via UR4XWA
**EO5EPD** via US4EWA
**ET3USE** via W2GR
**EU3FT** via W3HC
**F6IKG** via WA4QMQ
**FB8WJ** via N2OO
**FM5WE** via WF1N
**FO5RA** via KM5M
**FR7BE** via N1IBM
**GB3RN** via GØVIX
**GM5AXO** via K4EU
**H74C** via N6AWD
**HBØ/MUØBKA** via K4ZLE
**HC2DX** via PY2ZM
**HD1A** via WA4QMQ
**HF15ØIL** via SP8PJG
**HF25KVW** via SP5KVW
**HF8IL** via SP8PJG
**HG1ØSD** via HA8PH
**HG8SDS** via HA8PH
**HKØ/HK3JJH** via N4AA (1999-2001)
**HR3KLB** via K4ZLE
**HSØZEH** via W6ZIP
**HZ1MD** via PA2VST
**IU3X** via IV3SKB
**IZØ/MUØBKA** via K4ZLE
**J28EM** via W1TE
**J75A** via KU9C
**J88JA** via JA1WSK
**J88KS** via JA1FUI
**JT1FCX** via K4ZLE
**JW7VK** via LA7VK
**JY2RZ** via WA3HUP
**K4C** via KP4ARN
**K5C** via N1LN
**K5LTH/KH6** via WA3HUP
**K5LTH/KM6** via WA3HUP
**KB4ATV/4S7** via W9OL
**KP4KK/DU2** via WA3HUP
**KR4F** via WA3HUP
**KX6PO** via W9OL
**KZ5BP** via K4EU
**KZ5NG** via K4EU
**L28OO** via LU4OC
**LU3HV** via EA5KB
**LX/MUØBKA** via K4ZLE
**LZØ3KM** via LZ1BFR
**MD3LCR/P** via M3LCR
**MJ/DJ5BX** via DL1ZBO
**MUØBKA** via K4ZLE
**MWØBKA** via K4ZLE
**OD5/TF1MM** via TF3MM
**OHØHEY** via OH3TY
**OHØWK** via OH3WK
**OZ4DI** via OZ1HPS

*(The table of QSL Managers is courtesy of John Shelton, K1XN, editor of "The Go List," P.O. Box 3071, Paris, TN 38242; phone 731-641-4354; e-mail: <golist@golist.net>.)*

next few years as we sink into the lower levels of the 11-year solar cycle, making the higher HF bands of little use for DXing most of the time. Bigger and better antennas will see the light of day on those low bands and the competition is sure to be more intense.

How about this new 60 meter band? How many of you have even listened to those "spot" frequencies? There are serious limitations in effective radiated power and bandwidth, but I am seeing/hearing reports of activity down there, too.

How about WRC-03 and the shifting of broadcasters out of the 7100–7200 kHz band to allow an amateur radio expansion (see this month's "Washington Readout" column)? This is an event to look forward to in 2009, when it becomes a reality. It will greatly benefit phone operation on 40 meters, especially during contest periods. It remains to be seen how the band will be allocated by the various governments, but we can at least hope for an expansion of the U.S. phone band down to 7100 kHz, without the broadcast QRM we've lived with for decades. I can only imagine what it will sound like without the AM broadcast carriers and modulation. Personally, I still prefer the bottom 25 kHz of 40 meters on CW, but I have been known to sneak up into the phone band from time to time to work a new one.

### Upcoming Activities

There are some DXpeditions scheduled for the next few months that may be of interest to you. An operation from Annobon (3CØ) is planned for this October, and Banaba (T33) is in the works for March/April 2004.

Some other activities of interest to DXers are the W9-DXCC Convention coming up September 20 in Chicago and the WØ-DXCC Conference scheduled for October 18. Perhaps I'll see some of you in Chicago, although I can't make the WØ Conference.

Until next time, I hope you had a great summer and are ready for the upcoming contest and DX season.

73, Carl, N4AA

BY JOHN DORR,* K1AR

# Let's Not Forget Our Heroes

**September's Contest Tip**

If you're like most contesters, you've undoubtedly experienced the frustration that comes from hearing a rare multiplier answer a competitor's CQ and then quietly disappear into oblivion. The next time that happens, try calling CQ slightly off the frequency on which you were just listening. You'll be amazed at how many times that same station will answer your CQ. Many rare stations prefer to search and pounce, avoiding the enormous pile-ups that inevitably ensue. Some selective CQing on your part will often help your multiplier total, even if you're not one of the big guns on the band!

**Calendar of Events**

| | |
|---|---|
| Aug. 23-24 | Ohio QSO Party |
| Aug. 30-31 | YO DX HF Contest |
| Aug. 30-31 | SCC RTTY Championship |
| Sept. 6-7 | All Asian SSB Contest |
| Sept. 6-7 | IARU Region 1 SSB Field Day |
| Sept. 7 | North American CW Sprint |
| Sept. 10-12 | YLRL Howdy Days |
| Sept. 13-14 | Worked All Europe SSB Contest |
| Sept. 13-14 | Louisiana QSO Party |
| Sept. 14 | North American SSB Sprint |
| Sept. 14-15 | Tennessee QSO Party |
| Sept. 20-21 | The 45th SAC CW Contest |
| Sept. 20-21 | Washington State Salmon Run |
| **Sept. 27-28** | **CQ World-Wide RTTY Contest** |
| Sept. 27-28 | The 45th SAC SSB Contest |
| Oct. 4-5 | California QSO Party |
| **Oct. 25-26** | **CQ WW DX SSB Contest** |

It's fair to assume that nearly every sport has its heroes. Whether it's Major League Baseball's Hank Aaron or soccer phenomenon Pelé (football, if you prefer), there are idols we look up to and aspire to emulate with our own actions and accomplishments.

Ham radio contesting is no different. In recent times, it seems as if we are losing more and more of our heroes. Maybe it's just a mid-life crisis for some of us, but it seems as if this is one rate that is becoming disturbingly high. In light of so many of these losses, it occurred to me that we could benefit by taking pause and thinking about those we consider our heroes in contesting. With that in mind, I've prepared my list of contest heroes. In reality, there are many more, but space does not allow for full disclosure. I'll bet some of these fellows would be on your list as well. Undoubtedly, there are others who are unsung heroes to you, contesters who influenced your passion for contesting today and have made you what you are.

We all have our heroes. Here are just a few of mine:

## N5TJ, Jeff Steinman

Jeff has set the standard to which many contesters aspire. He has shown the rest of us what winning is all about and has done it consistently from virtually every venue one can imagine. Those results combined with style and grace make Jeff one of contesting's true heroes. That's not bad for someone who was a little-known ham in the hills of Missouri a short 20 years ago. While he may be N5TJ to you, many of us will always know him as "Kroy," a reference to his old callsign, KRØY. Kroy, you're a hero to K1AR for sure!

## N6TR, Larry "Tree" Tyree

Having recently been named Ham of the Year for 2003 is good enough for me. However, the real reason Tree makes my list of heroes is that he has given so much to our hobby in general and contesting in particular. Tree has been a driving force in contest log checking, spending countless hours developing software tools to make the lives of contest adjudicators easier. The fact that he also wrote the highly acclaimed TR-log logging program is just another feather in his cap. If we all gave back to our hobby a small percentage of what Tree does routinely, we would be better off. Now that's a hero for sure.

## N5KO, Trey Garlough

I remember when Trey was a youngster who looked up to us "experienced" guys in awe. Well, now that he's proven himself as a first-class operator, as well as inventing the widely acclaimed Cabrillo logging standard, Trey stands out in a class of heroes by himself. That's also not to mention the countless contributions that he offers—quietly behind the scenes—every step of the way. Trey is smart and driven. He's a contester to look up to and I, for one, do so on a regular basis.

## K1TO, Dan Street

Once upon a time, Danny Street worked at ARRL in the Contest Branch. His efforts were part of a new generation of log checking that has since revolutionized the world of contesting. In addition, there is the small matter of three consecutive WRTC championships, which add credence to his unparalleled operating abilities. Dan has proven that no matter where he sets up shop (Florida at the moment), he is a mover and a shaker, being a principal motivator behind the contest movement in that state. In the old-fashioned good-guy category, Dan tops the list. A hero you ask? You bet!

## N6AA, Dick Norton

Over the past few decades of contesting, who comes first to mind nearly every time when the subject of log checking is raised? You guessed it: Dick Norton, N6AA. There's no individual who has given so sacrificially over the years, not to serve himself,

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but simply to improve the sport of ham radio contesting. Dick is an accomplished operator, too. Just recently he achieved the incredible goal of operating from all 40 CQ zones in the CQ WW Contest. There's no doubt where Dick stands on the K1AR hero list.

## N6TJ, Jim Neiger

What is that deep, resonant voice I hear behind me? Oh, it's Jim, N6TJ. There must be something about the "TJ" suffix that makes a contest operator stand out. Of course, standing out is something Jim enjoys regularly! Jim is the consummate ambassador of contesting. His wit and charm, combined with decades of operating success, leave me and countless others in a state of awe. When others are retiring or moving on to other things, Jim just keeps on cranking. There must be a secret hidden somewhere that describes the formula to his success in contesting. The fact that he's my hero, however, should not be a secret at all.

## K5ZD, Randy Thompson

Randy is today's brand of a brash and aggressive operator who succeeds nearly every time he tries. He is a ground-floor member of contesters who have proven high-speed operating and accuracy can be used in the same sentence. The fact that he has built a world-class contest station proves that he has what it takes to be a leader in our midst. Randy is worthy of being called a hero. Being a consistent winner is what heroes are made of and Randy is one of the best!

## N2NT, Andy Blank

Do you need practical answers to real problems? Can you solve a station's switching problems, while talking about the 200-hour rate you had during last year's CQ WW CW Contest? Andy has been someone I've looked up to for nearly as long as I've known him. He demonstrated the depth of his commitment and knowledge nearly 25 years ago when we operated Field Day with towers everywhere, kilowatts on every band, and a "who's who" list of operators. Whatever Andy decides to do, it always gets done. He's not a talker; he's an achiever. We all should be so lucky to have a hero and a friend like him!

## K7SS, Danny Eskanazi

Well, here's another fellow who doesn't understand the concept of standing still. Whether it's his success as a small businessman, or leading the


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charge in the creation of the WRTC concept in 1990, Danny is a hero's hero. Over the years, I've known Danny to be a fellow who capably pushes the envelope and never accepts "no" as an answer to something he is passionate about. In my book, K7SS can lead anything he believes in. By the time I'd get started on the same task, he'd already have produced heroic results!

### K1ZZ, Dave Sumner

Dave's contributions to ham radio are well known. To this day, he's providing leadership that benefits contesting, as well as all of ham radio. In addition to his role at the ARRL, I'll always appreciate Dave's wit and raw intelligence. He is one of those guys in life who would be successful in whatever he decided to do. Fortunately for us, that includes a slice of life we call contesting. When it comes to operating, there's only one word to use for K1ZZ—*accurate*. Dave is a machine when it comes to callsign recognition and regularly has been one of contesting's most accurate entrants. Heroes are those the rest of us look up to and want to emulate. I'll never hold a candle to Dave's skills. I will, however, always consider him a hero of mine.

### W3LPL, Frank Donovan

I was just a young buck, but I distinctly remember the first time I drove up to the old W3LPL QTH and saw those enormous Yagis from a distance. During the summer of 1975, I spent nearly all of my spare time at Frank's house (and on his towers) and learned from the master what it takes to build a world-class contest station. Not only is Frank skilled at antenna design, he knows a thing or two about operating, too. Frank's enthusiasm became mine in those days, and like Frank's, mine has never waned. It was Frank who gave me my first taste of big-time contesting. As it is with so many contesters around the world, he's my hero!

### K1EA, Ken Wolff

I've known K1EA for nearly 30 years. Some of you know him because of his logging program accomplishments. Others are familiar with his incredible station in Harvard, Massachusetts. I know him as a decent human being who cares about things that matter most in life—his family, security, and the desire to give something back to others. It's easy to call Ken my hero. It would be easy even if I knew him from afar. In this case, I know him close-up and personal. They simply don't get any better.

### K1GQ, Bill Myers

Can you remember the first time you drove a car, or when you received your first paycheck? I had a first at the station of K1GQ—my first winning single operator effort in the CQ WW. Only minutes before the contest, with a multi-single plan firmly in place, Bill asked if I wanted to run the station by myself. I'll never forget his generosity. Bill has always been a quiet and unassuming achiever. His well-earned reputation derived from a multitude of accomplishments in KH6 is legend to many. To this day Bill continues to contribute, providing critical technical support and decades of operating experience to the monstrous KC1XX super station. What's to say about Bill being a hero of mine? Nothing. He simply is.

### W4AN, Bill Fisher

Bill Fisher is a "doer," pure and simple. His contributions to internet-based contesting tools (i.e., contesting.com, e-ham.com, and so on) are widely acclaimed. He's also demonstrated a natural ability to build the world-class station that whooped my rear in the 1999 CQ WW CW Contest. Most important, he's a good friend. It's easy to call W4AN my hero. I suspect it is for many of you as well.

### K1DG, Doug Grant

Okay, most of you know K1DG is my brother-in-law. However, our common family thread is only part of the story. I've known Doug since I was 16 years old. We went to college together. We've operated at some of contesting's finest stations together. We've won contests and even managed to work as a team in all of the WRTC events (without killing each other). In my book, you're allowed to have family members join your hero club. If we only did half of the things we've done together, he'd still be way ahead of most when it comes to my definition of an idol. We all should be as lucky as I've been to have this guy in the log.

### KØDQ, Scott Redd

How many guys do you know who can perform at competitive levels in the 1970s, take a few decades off to serve our country offshore, and return to contesting 30 years later as if they never left? That describes Scott Redd, KØDQ. Hopefully, a few of you will remember that contest machine, XE1IIJ. Scott defined high-rate contesting in those days and has demonstrated over the past year that he hasn't lost his touch. Scott's a hero of mine for his contributions to ham radio, his service to his country, his faith in God, and for being such a good friend. The defense rests.

### N2AA, Gene Walsh

I've known Gene for at least 100 years, maybe more. In all that time he has demonstrated a commitment and unchecked enthusiasm for contesting that is unparalleled. Gene was a contest man when operating at 5A1TW in the early 1960s, and he's still the same contest man sitting on 20 meters at KC1XX in 2003. Gene makes it easy to be part of the K1AR hero list. He simply is one to me.

### K3EST, Bob Cox

There are so many ways to describe Bob Cox. He's an expert contest operator. His leadership in directing the CQ WW Contest for so many years has helped made it what it is today. For me, however, there's subtlety behind the Bob who is known out there. Bob has been a driving force in my own personal contesting development. It actually began when I was just a teenager living in Maryland. Bob befriended me and took me under his wing. He was responsible for "getting me in" at W3AU, and I'll never forget the first night on 40 meters as he chastised me for not "keeping the rate up." I learned more in those first five minutes of operating than he'll ever know. A hero? There's no doubt in this case.

### W3AU, Ed Bissell

My first experience operating at a world-class multi-multi station was at Ed Bissell's place. I'll never forget how excited I was when I was first given the operating keys to this monster station and began sending "CQ TEST W3AU W3AU TEST." It seemed surreal. It still does today. Ed was one of the most gentle and caring individuals I've ever met. He enjoyed hosting contests as much as we enjoyed operating them. Ed passed away recently. It's a shame that so few of today's contesters got a chance to meet him. If you had, your hero list would go up a notch, just as mine did.

### W2PV, Jim Lawson

What can one say about Jim Lawson in just a few sentences? His accomplishments in life far exceeded anything he did in radio. However, for most of us, we would be satisfied with just the radio portion of his resume. Jim was a technical giant. His antenna designs and

knowledge about stacking Yagis were respected around the world. I had the privilege of operating many times at Jim's station. There was no finer station that I have ever used from an engineering point of view. Perhaps, too, there was no better station owner. We all like to tell our stories of contest years gone by. Rarely do we get the opportunity to do that without W2PV entering into the conversation. I'll never forget the day we delivered Jim's World High CQ WW trophy to him as he was nearing death from the ravaging effects of cancer. The one thing that I recall in between my tears was the fact that I was in the presence of a true hero of mine. Fortunately, he's still with me in spirit every time I operate.

### W4KFC, Vic Clark

How many hams do you know whom people still talk about 20+ years after they have passed away? Vic Clark was one of the standards by which contesting was measured in years past. Whether it was his distinctive sending or deep voice saying, "W4 Kilowatt Frequency Canada," many of us will remember his enormous signal and caring heart. Vic didn't have a big station, but he sure had a big signal. If you listen closely, there are still people calling him on 80 meters CW from the 1970 ARRL Sweepstakes. It's an honor to type his name on my keyboard this month. It's an even greater honor to call Vic one of my heroes.

### KH6IJ, Katashi Nose

For decades Katashi Nose participated in contests with skill and enthusiasm. Working KH6IJ in a contest was as reliable as working the guy next door. Nose was a machine, whether it was on CW or phone. Sadly, there aren't many like him out there anymore. In addition to operating skill and championship passion, Nose offered the contest community style and grace. I consider it an honor to look at my old logs and see his callsign recorded on many of those old, torn pages. Well done, my hero.

### K2GL, "Buzz" Reeves

I never met K2GL, but, I sure heard his station and was brutally punished in many contest pile-ups. Buzz set a standard for contesting that went well beyond money, towers, and radios. He knew how to build a loyal team of world-class operators, and more important, how to compete. I don't believe K2GL really knew who I was. I can guarantee that even know we didn't know each other, he will always be a hero to me. Great achievers bring that attribute out of most people, and Buzz was no exception.

### W3GRF, Lenny Chertok

Most of you probably never met Lenny. Having left us many years ago, he was a contest legend in the Potomac Valley Radio Club. During my college-free summers I had the opportunity to get to know Lenny and the mentoring influence he had over so many new contesters. At the time, I was relatively unknown in contesting circles, yet Lenny took me under his wing and spent countless hours sharing his old, sage contest experiences with this young ham from Upper Marlboro. There are not many conversations in life that you can remember 30 years later as if they were only yesterday. As my hero, W3GRF seemingly spoke to me just the other day.

### LU8DQ, Jorge Bozzo

Can you spell high-speed CW? Jorge's operating ability on CW was seemingly effortless. He was a machine that made a zone 13 QSO as easy as drinking a glass of water. Jorge had a string of contest achievements that most of us only dream about. His passion for contesting was demonstrated by his unceasing level of activity and ability to work thousands on end. If you never worked LU8DQ, you missed out on an opportunity to learn from the master what CW contesting is all about. Jorge and I only had a few non-contest QSOs over the years. Our collective time in QSOs during contests probably adds up to only two or three minutes. It takes quite a man to become a hero in only 180 seconds. Jorge did it for me, and many others, with time to spare.

### G3FXB, Al Slater

Al Slater was another clear-channel contest guy who probably made it into as many contest logs as any other competitor. I was disheartened when Al left us, because he was one of contesting's legends. His crisp, clean operating style was to be emulated. Whether it was that friendly "Hello John, G3 Fox Xray Baker, you're 5914" or "59914 G3FXB," as sent by Al's distinctive fist (yes, he did run that X and B together, didn't he?), it was always a thrill to work him. Al was a hero to many and is certainly one of mine.

### K3LR, Tim Duffy

Tim Duffy. Those two words are synonymous with excellence. Tim has been


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a leader of men in all aspects of his life. Ham radio is just one small example. But putting aside the rest of Tim's portfolio of accomplishments, his achievements in ham radio alone provide for an easy path to hero status. Whether you choose to measure one's heroism by operating talent, technical prowess, ability to rally the troops, or delivery of first-class entertainment/information at Dayton, Tim has done it all. I'm proud to put him on my list of real heroes!

## In Conclusion...

Frankly, the biggest challenge I had this month was whittling down my list of heroes to a size that *CQ* would be able to publish. There are so many others I respect, and you know who you are. Please accept my apologies, in advance, for excluding you.

More important this month, I ask that you think about your list of heroes. Remember them. If they're still with us, let them know how much you appreciate their contributions, both to you personally and to contesting at large. As we continue to grow older, we're going to be losing more and more of our heroes. Let's be sure that we don't forget how much we value those who are still with us.

## Final Comments

Can you believe that the fall contest season is only a few short weeks away? For me, I'm gearing up for another trip to the super contest station at PJ2T, where we plan to do our thing in the CQ WW Multi-2 category. Speaking of the WW, I hope you enjoy reading the results that have been published in this issue (and last month as well). The amount of work that is required to pull everything together is staggering. If you think of it, take a moment and thank one of your favorite CQ WW Committee members. I guarantee your input will be greatly appreciated.

Well, that's it for this month. As a reminder, *CQ* has been publishing links to most contest sponsors' websites for some time now on its own site, <www.cq-amateur-radio.com>. If you are looking for a quick path to the rules for a particular contest, I suggest you check it out. 73, John, K1AR

## Remembering Steve Miller, N8SM

*Steve, N8SM, left us entirely too early, but he had so much to be proud of in the 38 years he was with us. Rest in peace, OM. (Photo via Bob, N5NJ)*

As many of you may already know, as we published here last month, we recently lost our good friend, Steve Miller N8SM, in a tragic accident when he fell from a height of about 50 feet on his tower. There were no witnesses, and Steve was working alone, so we do not know what happened. Ironically, Steve had extensive experience in tower work and antenna installation. In recent years, he had erected a 136 foot tower and installed several antennas as part of his overall effort to build a competitive contesting station. An experienced contester and DXer, Steve, of Prosper, Texas, was only 38 years old.

First licensed as WD8IXE in 1977 at the age of 12, Steve, a native of Ohio, enjoyed contesting and DXing. He routinely operated the CW weekends of the CQ WW, ARRL International DX, and ARRL November Sweepstakes events. He also operated as J68AG from St. Lucia in the Caribbean and participated in a few DXpeditions, including several operations as a member of the J6DX team in the 1980s and 1990s. Besides ham radio, he enjoyed playing jazz saxophone.

A memorial service held on June 19th was well attended by many local amateurs and a large contingent of fellow employees from the Broadband Wireless Access group of Texas Instruments in Dallas. His wife had a blanket of flowers made with Steve's callsign spelled in roses.

Steve was very focused on his family and spent all of his time with his wife and daughter. I ask that you keep Steve's family in your prayers. The N8SM callsign was put on the air one last time in the recent IARU contest this past July. It was a sobering reminder that life is short and we should always make the most of it. Rest in peace, OM; you are missed by many.

*(Sources: N5NJ,* ARRL Letter*)*


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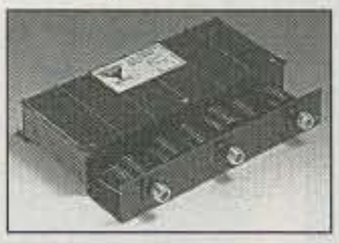

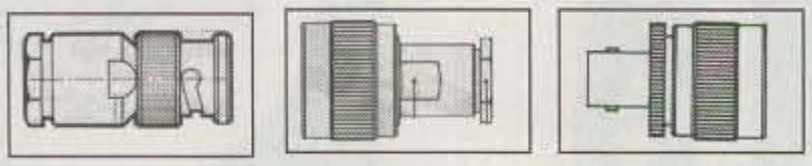

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BY JOE LYNCH,* N6CL

# Almost Across the Pond on 2 Meters

The frequent and huge 144 MHz sporadic-*E* openings that occurred all across Europe this past May and June continued through the rest of June and into July. One such opening, which occurred on June 26, featured double-hop sporadic-*E* propagation across the Atlantic Ocean on the FM broadcast band. These openings caused Udo Langenohl, DK5YA, to speculate that the MUF may even been as high as 144 MHz. Thanks to his documentation of this and the other openings during the present sporadic-*E* season, the following summaries of openings are presented below:

**June 20, 2003:** MUF was extreme high today. Wow, what a huge cloud again. At 0700 UTC MUF was rising very fast and rapidly over northern France and Belgium. First 144 MHz signals detected in I4 at 0945 UTC from G-land and suddenly a big opening started. Some G operators made DL contacts on QRB 670 km; some sporadic-*E*-caused signals were far, far beyond S9. This time the MUF was almost at 260 MHz! That's something, isn't it? Many reports say that signal strength was incredible, end-scale reports on and on. Opening lasted until 1117 UTC, when last signals from GM were heard in IT9. Again 144300.0 MHz was the center of activity, but much more discipline today with the boys from UK, but usual chaos in DL. Countries involved today included: G, GM, GI, GW, EI, PAØ, LA, OZ, SM, SP, DL, OK, OM, OE, HB9, S5, 9A, T9, YU, I, IT9, EA, and F.

**June 21, 2003:** A very brief opening today. The MUF was high all day, reaching 100 MHz a few times in the late morning and in the afternoon both in eastern and western Europe. Italian broadcast was very strong in Wales and England at 1700 UTC, and a very brief opening from SV to DL, F, and G happened from 1741 until 1812 UTC with short openings that appeared to be more like meteor scatter than sporadic-*E*. The only station active in SV was SV3CYM, as usual; he's there 24/7, I guess! There was another one at 1030 UTC plus or minus a few minutes. This was a short opening from I3 to CT. Countries involved today included: G, F, DL, I, CT, and SV.

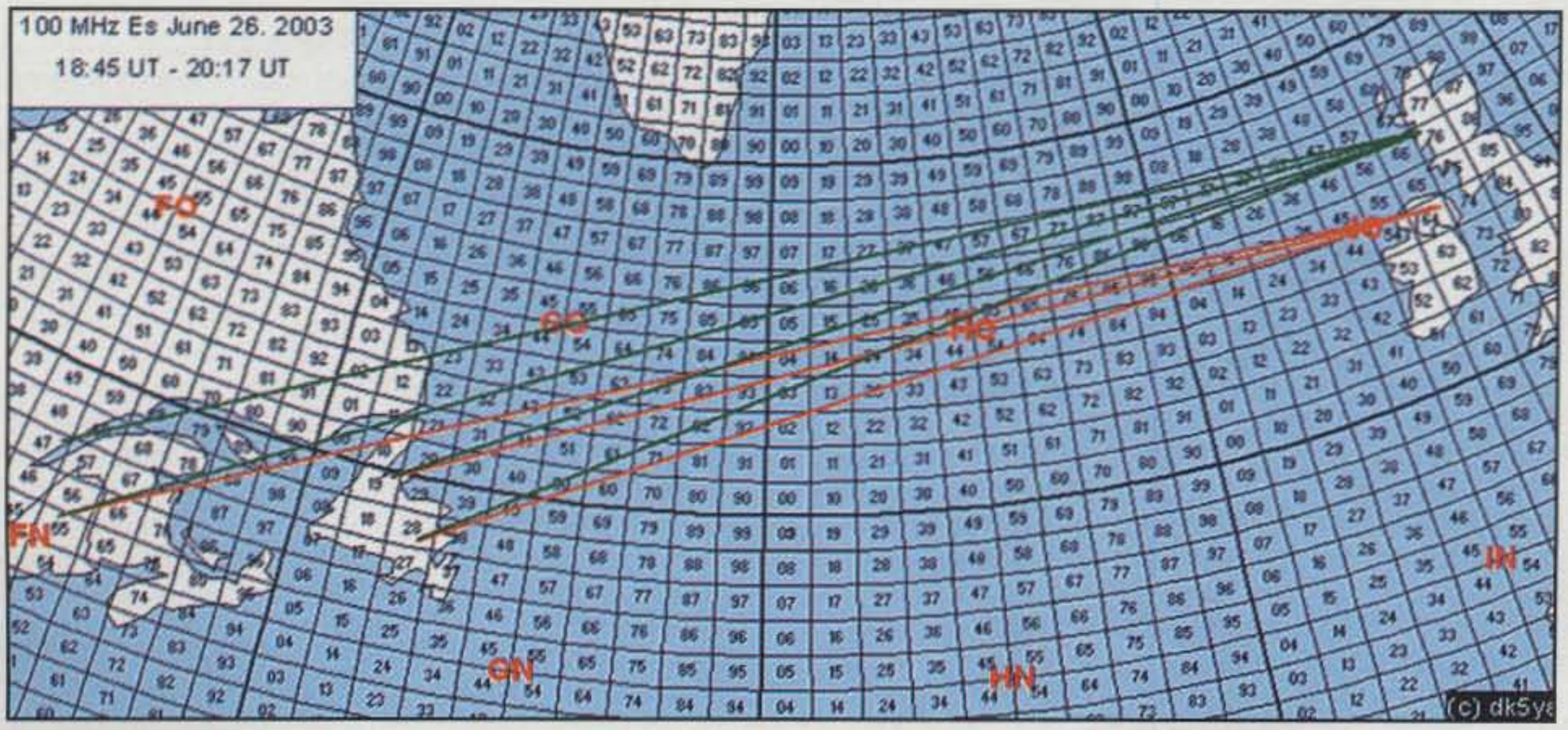
**June 22, 2003:** Sporadic-*E* becomes usual or what? Again and again, the year 2003 is *the* season! The MUF was very high from early morning both above southern France and the north African coast line. Extreme short skip took place at 0845 UTC from EA1 to EA3 on 50 MHz, a good sign for 144 MHz sporadic-*E*. At 0900 UTC broadcast from both Italy and EA was very strong in G and PAØ up to 108 MHz. We had two clouds being active: one at northern Spain/southern France and another one above the southwest Mediterranean Sea. The first signals appeared on 144 MHz at 0941 when EA5 was into GW. Then the big opening started. It was a good idea for the boys in CN8 to be active today, as many made a new DXCC. Several G and PAØ ops had luck with 7X too *(not me, again—ed.)*, while a few I4 and I5 stations made EA8 in JL18. At approximately 1200 UTC we had another high

*e-mail: <n6cl@fuller.edu>*

## VHF Plus Calendar

| | |
|---|---|
| Sept. 3 | First quarter Moon |
| Sept. 5 | Lowest Moon declination |
| Sept. 7 | Moderate EME conditions |
| Sept. 11 | Full Moon |
| Sept. 13-15 | Sept. VHF QSO Party scheduled dates; see text for details |
| Sept. 14 | Poor EME conditions |
| Sept. 16 | Moon apogee |
| Sept. 18 | Last quarter Moon |
| Sept. 19 | Highest Moon declination |
| Sept. 19-21 | 22nd Annual ARRL and TAPR Digital Communications Conference; see text for details |
| Sept. 20-21 | Second weekend of the ARRL 10 GHz and Above Cumulative Contest |
| Sept. 21 | Moderate EME conditions |
| Sept. 25-28 | Microwave Update; see text for details |
| Sept. 26 | New Moon |
| Sept. 28 | Moon perigee; Moderate EME conditions |

*—EME conditions courtesy W5LUU*




*Map showing the June 26, 2003 FM broadcast-band sporadic-*E *opening paths between eastern North America and western Europe. (Map courtesy DK5YA)*

MUF cloud in the east. Broadcasts from TA and SV in DL and Russian TV at 97 MHz were booming for two hours. However, it was nil on 144 MHz. Your guess—that's all? Wrong! The show started again at 1445 UTC—same place, same cloud. Again a huge opening occurred from DL, PAØ, and G to EA, EA9, EA8, and 7X. Interesting: EA6 made SV9 too! Your guess —that's all?

No! At 1721 UTC the band was open again, now from 9H1 and IT9 to northwest France and from EI to Italy with booming signals again! All in all, more than 6 hours of 144 MHz sporadic-*E* today—wow! Countries involved today included: G, GM, GI, GW, EI, F, ON, PAØ, OZ, DL, OK, OM, OE, HB9, HA, S5, 9A, I, IS0, IT9, 9H1, 7X, EA, EA6, EA8, EA9, CT, CN, and SV9.

**June 26, 2003:** Almost across the pond! We've been close to it—the final step across the pond. The MUF was very high the whole day in Europe. In the morning broadcast from EA was into G, PAØ, and DL for hours up to 108 MHz, but nil on 144 MHz. In the afternoon we had a short opening on 144 MHz from F2GL (JN17) to LZ1ZP (KN22) at 1655 UTC; that one lasted only three minutes. Then late at the evening CT1EPS made D44TD!

In the evening of June 26 there was a huge multi-hop opening that started across the Atlantic Ocean. There were lots of VEs and Ws into Europe on 50 MHz with booming signals. The MUF was rising and rising—up to 100 MHz from Maine/USA and Newfoundland/Canada to GI and GM. Perhaps it was on 144 MHz too? Who knows, because it's hard to find anyone active on 2 meters in VO1.

We have two recordings of broadcast stations (on the web: <http://www.vhfdx.de/es_summary_03_june_26. htm>) from Newfoundland made by 3 meter DXers in Northern Ireland and Scotland. Thanks to G1AAR for the audios! *(Udo also posted the following comment from Charles, EI5FK, who wrote: "This will probably interest many people here. I worked with a radio officer in the Irish Navy who after changing jobs told me that he clearly heard US or VO Coastguard [I forget which] on 156 MHz from less than 200 miles outside the Irish coast one summer about 15 years ago. Taking into consideration both sides were using vertical aerials of low gain and that the VO/US Coastguard was probably using less than 25 watts, I believe that the main problem is a lack of hams willing to put in the effort on 144 MHz." There are other pertinent comments posted on that URL as well.)*

**June 28, 2003:** From Europe to Asia, what a nice and huge opening with rare callsigns today. The MUF was high the whole day, reaching almost 100 MHz at early afternoon from DL and HA to SV and TA, while Arabian broadcast was strong into UA6. That cloud moved to the southeast later while MUF was still rising, reaching 144 MHz at 1440 UTC. The first signals from S5 into JY (!) and 4X4. A nice opening started all across that cloud, from north to south and east to west. Lucky boys in I and S5 and YU made both OD5 and JY and also 4X4, while UA6 was lucky with 9H1 and IT9. Strange that at 1611 UTC SV1 was also into EA5, another cloud active above ISØ? Later the cloud was moving back northwest slowly and SV9 was into northern Italy and southern France, while still OD5 made contacts with I4 and I5. The last signals heard at 1647 UTC. At approximately 1830 UTC the band opened again from southwestern Portugal to southern Italy but only for a few minutes. Countries involved today included: EA, F, I, IT9, S5, 9A, HA, YU, T9, YO, UT, UA6, SV, SV9, 5B4, OD5, 4X4, and JY.

**June 29. 2003:** Two nice clouds suddenly. Poor conditions existed the whole day through, but like the days before, suddenly in the afternoon MUF was rising pretty fast over central Europe. At 1400 UTC 50 MHz was almost dead, at 1500 UTC the band was crowded, and at 1600 UTC there was broadcast from Italy strong into the UK and from EA into HA. At 1630 UTC 144 MHz was open from EA to HA and SP, while YU and T9 were into G and GW. Later SV and 9H1 made contact with stations in SP (a second cloud), while LZ was into southern DL and EA into LY and YL. At the same time UT5 was into southern France, while northern Italy made YO and LZ. The cloud was moving north and G made HA, YU, and YO, when at the end there was EI into eastern DL and OK while GW was into LY. It was a strange movement of both clouds—and a really nice mix all across Europe. Not a ping, by the way, in JN49. Countries involved today included: EI, G, GW, GI, GJ, GM, DL, LX, OZ, SM, LA, LY, YL, SP, OK, OM, HA, UT, S5, 9A, HA, YU, T9, YO, LZ, SV, I, EA, F, and HB9.

**June 30, 2003:** "Sporadic-*E*" is dead. Welcome to "usual-*E*"! What is "sporadic-*E*"? It must be some ancient mode from former times, because in 2003 we proudly present "usual-*E*"! Yes, another day on 144 MHz in Europe, this being number 26, the best season for many, many years. The MUF was not quite so high most of the day even though 50 MHz was in good shape. Again in the late afternoon the MUF was almost exploding, this time above the north African coast. Jannis, SV3CYM, was on as usual on 144.300 MHz and made EA9 and a bunch of EA7 QSOs while CT was into 9H1, IT9, and I5. Later EA5 made 9H1 too, and Nacho, EA1AK/7, had luck with SV9 for a contact at a distance of 2.794 km! At 1729 UTC the second cloud in the east reached 144 MHz, again a nice opening for Genadij, RZ6BU, and the boys from UT5 to I, 9A, S5, and YU. This one lasted until 1754 UTC, a short one. From 1600 until 1645 UTC broadcasts from TA and SV were booming in DL; nil so far on 144 MHz at this QTH. Countries involved today included: EA, EA9, CT, I, IT9, 9H1, SV, SV9, 9A, S5, UT, and UA6.

**July 2, 2003:** A *big* cloud down south: This was the first day since the beginning of May that even 50 MHz was almost dead the whole day in Europe—except the very southwestern part of Spain. In the afternoon a huge cloud formed in this area, covering a very wide range. At 1600 UTC 144 MHz suddenly opened from EA8 to almost the whole of Spain. Perhaps some made the "144 MHz Worked All EA8" award today, hi. Later this cloud was really huge because EA8 and CN were working into ISØ and southwest France at the same time! France was waiting for D44, but no tropo to enhance sporadic-*E* propagation from D44 to EA8 to F. MUF was high at times (>200 MHz) because the QRB was quite short from CN to EA5 and EA6 and from EA6 to CT, and there were several EA8's working with quarter-wave sticks and 25 watts on FM! Later CN was working into I and EA1 at the same time as F was end-scale in EA8! Surprise, CN was also worked in G while EA9 was into HB9 and heard shortly in DL. This happened when CT made I8 and IT9 plus 9H1. You guess—that's it?

Wrong, the cloud came back! At 2006 UTC CN, EA, and EA9 were into F, HB9, I, LX, and DL, while CT made I8 again, with the last signals being heard at approximately 2040 UTC. There were still short openings from EA8 to EA1 and EA2 until midnight. This was a very big and strong opening when almost the whole of EA and CT were covered by this sporadic-*E* cloud! Countries involved today included: CT, EA, EA6, EA8, EA9, CN, F, G, HB9, DL, LX, I, IT9, ISØ, and 9H1.

**July 5, 2003:** Early bird and contest fun—seven hours sporadic-*E* on 144 MHz. Part 1 (0650–0905 UTC): In the very early morning the MUF was extraordinary high in the eastern part of Europe. While there was broadcast from TA and SV into DL and Italy at 0600 UTC another cloud was strong above TA, bringing broadcast from 4X4 and several Arabians into UA6 and UA4. At 0650 UTC SV3CYM started the game with DL on 144 MHz, and a bit later the chaos began. Due to the fact that many were /p for the upcoming contest testing rigs and PAs, activity was quite high and so was the QRM. The MUF was rising also in the east, bringing 4X4 into UA4 and UA3, and at the same time the boys from Israel were also working into HA and SP. Some say that this opening was meteor-scatter-enhanced because signals were strong for just a few seconds. The last signals appeared at approximately 0900 UTC. Countries involved during this opening included: EA, EA6, F, PAØ, ON, DL, SP, OK, OM, HA, HB9, YU, LZ, YO, I, IT9, 9H1, ISØ, SV, SV5, 4X4, UT, UA3, and UA4.

Part 2 (1404–1909 UTC): The big cloud in the east didn't disappear; it came back in the afternoon, better and stronger than before. At 1400 UTC the first signals appeared on 144 MHz from Italy in and out in UA6, and at approximately 1415 UTC an incredible opening started that lasted for some five hours! With lots of help from the contest that took place in both east and west Europe, we had very rare squares and a bunch of UT and UA stations on 144 MHz. Some OK and SP ops were busy for hours working UA6 and UT5 on FM on 145.500 MHz for the contest; that's fun. Several TAs were on! Not only on FM but also on SSB for the contest; that's good news for the future. Contacts with EK6DZ/p in LN10 were made from HA, OK, LY, SP, and DL! At 19:59 LZ3NY made 7X2 and heard CT3AN (3,652 km!) for the last sporadic-*E* today. Countries involved today included: PAØ, DL, HB9, OK, OM, SP, LY, YL, ES, EW, ER, UA3, UA4, UT, EK, Z32, SV, SV8, TA, LZ, YO, YU, 9A, S5, OE, I, 9H1, and 7X.

**July 6, 2003:** Again twice, but short today. Thanks to the contest, activity was pretty high and again we had two openings on 144 MHz that we usually would have missed, I guess. MUF was very high from the very early morning almost at the same place as yesterday, above Romania. There was another opening from east to west, UA6 and UT5 to I, S5, 9A, and YU, while SV8 and SV1 were into UA3 and UT5. This one started at approximately 0700 and lasted until 0750 UTC. Later this cloud was moving northwest and the MUF was rising again when at 0832 UTC first signals on 144 MHz were heard in DL and PAØ. This opening lasted until approximately 1055 UTC with LZ, YO, HA, and YU into DL, PAØ, ON, G, GW, and EI, plus LY with ISØ and I. Later there were very spotty ones from HA into G again, but more meteor scatter than sporadic-*E*. Countries involved today included: OZ, DL, PAØ, ON, G, GW, EI, LY, UA3, UA6, UT, YU, T9, LZ, YO, S5, 9A, I, ISØ, HA, and SV.

**July 7, 2003:** Short and spotty twice. The 50 MHz band was dead in Europe in the morning. No signals from hams and nothing on TV. Later in the morning the MUF was rising very quickly in the northwest Mediterranean area, and at 0949 UTC there was a short burst from I8 into F and EA. A few minutes later EA1 and F made I8 from IM88. Then we had a short break for some 20 minutes while the cloud was moving slowly northwest. The MUF was up again, and short and spotty openings took place from CT and EA into DL, HB9, OE, and I. Later in the afternoon another cloud was active in the east (again above Romania) for very short 144 MHz opening from S5 and YU into UA6, just for a few minutes. That time the MUF was also pretty high above DL, bringing French broadcast into the Baltic region up to 108 MHz while OIRT-TV Channel 5 was booming in DL at 94 MHz. Countries involved today included: DL, HB9, OE, I, F, EA, and CT.

**July 8, 2003:** Southwest again—twice. Today featured another usual sporadic-*E* opening in Europe. The MUF was not really that high in the morning and early afternoon. At approximately 1500 UTC the first broadcast signals from EA were into PAØ and DL and the MUF was rising pretty fast again. At 1524 UTC a very short and weak EA7 was into DL, but at 1545 UTC 144 MHz was in a good shape for a nice opening. While EA and EA6 and CT were into DL, PAØ, OK, and SP, G also made I and EA6 contacts. One QSO reported so far from DL (JN49) to EA8 and one from DL to CN8. The band closed at 1645 UTC, until 1755 UTC when the second leg started. Again EA7 was into DL, while CT was into S5, HA, HB9, and DL. This one was very spotty and short, just like meteor scatter, some said. 7X2LS was also QRV, but alas, again after the opening. Countries involved today included: EI, G, GW, PAØ, ON, F, DL, OZ, HB9, OE, HA, S5, I, EA, EA6, EA8, CN8, and CT.

**July 9, 2003:** Almost a copy of yesterday. Again and again and again, I wonder what's goin' on in the ionosphere this year? This ain't normal. Today is just a one-to-one copy of yesterday's 144 MHz sporadic-*E* propagation. Not that much QSB and much more activity in Spain and Portugal today. The cloud was almost at the very same place, really strange. In the early morning the MUF was pretty high, OIRT R5 was booming here in JN49 at 0700 UTC. Later this cloud started moving west, and on its way we had broadcast from SV, I, 3V8, and 7X in DL until noon. Nothing on 144 MHz but a short and spotty opening from F to CT and CN8 and another very short one from G into EA7.

The "big bang" came in the afternoon, absolutely similar to yesterday. At 1515 UTC the first 144 MHz signals from EA7 were heard in DL and from EA1 into S5 and 9A. A few minutes later a big opening started from southwest to northeast and from northwest to southeast. Again CN8 and EA8/ DL6FAW was made, just like yesterday. This one lasted until 1725 UTC. Very loud and strong broadcast from EA was heard until late evening into DL and G. Countries involved today included: EI, G, GW, PAØ, ON, F, DL, OZ, HB9, OE, OK, OM, SP, HA, S5, 9A, I, ISØ, 9H1, EA, EA6, EA8, CN8, and CT.

**July 14, 2003:** A very short and early one. Very early in the morning an extremely short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and spotty opening occurred between the Canary Islands and the southwest of France. This is strange because 50 MHz was totally dead and even 28 MHz was silent; there was no short skip at this time. Furthermore, nothing happened the whole day through. The 50 MHz band was almost dead all across Europe until late afternoon. There were just a few QSOs on 50 MHz from EA7 to W and VE, but nothing else in Europe this day. Countries involved today included: F and EA8.

Udo's documentation ends on July 14, 2003. Next month the remainder of the season's reports should appear here. In addition, an article about this intense sporadic-*E* season is slated for the fall issue of *CQ VHF* magazine.

## Amateur Radio on the International Space Station

During a recent impromptu interview that your editor conducted with ARISS team member Ken Nichols, KD3VK, Ken disclosed that plans for upgrading the 2 meter station and even installing an HF station onboard the ISS are nearing completion. While it was initially thought that the next phase of the ISS's amateur radio stations would be put on hold until the return of the shuttle services, now the plans being formulated include the use of the Russian's *Soyuz* TMA-1 vehicle as the transportation mode for getting the equipment to the ISS. Ken indicated that testing of the Yaesu FT-100D is still under way, but when it is completed sometime early next year it could be put on board one of the *Soyuz* vehicles used for crew rotation or even for resupplying the ISS. At present, the timeframe for this to occur is sometime in the early part of next year.

## Current Conferences

The **22nd Annual ARRL and TAPR Digital Communications Conference** will be held September 19–21 in Hartford, Connecticut. For details see <http://www.tapr.org/tapr/dcc/index.html>.

This year's **Microwave Update** will be held in Everett (Seattle), Washington September 25–28 in cooperation with the Pacific Northwest VHF Society. See the Microwave Update website at <http://www.microwaveupdate.org/>.

## Current Contests

The September **ARRL VHF QSO Party** is the 13–15. The **144 MHz Fall Sprint** is September 15. The second weekend of the **ARRL 10 GHz and Above Cumulative Contest** is September 20– 21. The **222 MHz Fall Sprint** is September 23.

Complete rules for the ARRL contests can be found in the *QST* issue the month prior to the contest or the month prior to the first weekend of contests extending over two months, and on the League's website, <www.arrl.org>. Complete rules for the Fall Sprints can be found at the Southeastern VHF Society's (the sponsor) website: <http://www.svhfs. org>. Please note that the dates for the Fall Sprints are unofficial, as official dates were not available at press time.

## And Finally . . .

It now appears that the crew of the shuttle *Columbia* may have known they were in serious trouble, and in the last minute before the spacecraft broke apart, may have disengaged the autopilot and tried to manually fly the shuttle. This information comes from a July 16 report in the *The New York Times*. In addition, preliminary reports from the Columbia Accident Investigation Board (CAIB) indicate that the tragedy may have been averted if NASA officials had acted on warning signs of less-severe damage on previous flights. As you may already know, three of the crew members who died in the accident were hams, and two of them were active in the ARISS program.

What can we learn from this tragedy? There are two important lessons. First, most accidentally caused tragedies are preventable. Yes, this is a controversial statement. However, if you stop and think about it, many times people are injured or lose their lives in accidents due to carelessness. In the case of the *Columbia* the carelessness was in not heeding warning signs from previous flights that were damaged by the debris falling off the fuel cell and hitting those shuttles. Also, we will never know if an in-flight rescue could have been accomplished. There are scenarios that have been discussed that indicate there was the possibility—if only the concerns that emanated from those e-mails of the lower echelon engineers were brought up to the surface of the bureaucracy at NASA during the shuttle's 16-day flight.

Second, we have learned that it is necessary to take precautions to prevent future tragedies. As outlined by the CAIB, the strategies that NASA will implement for future missions may save the lives of future astronauts.

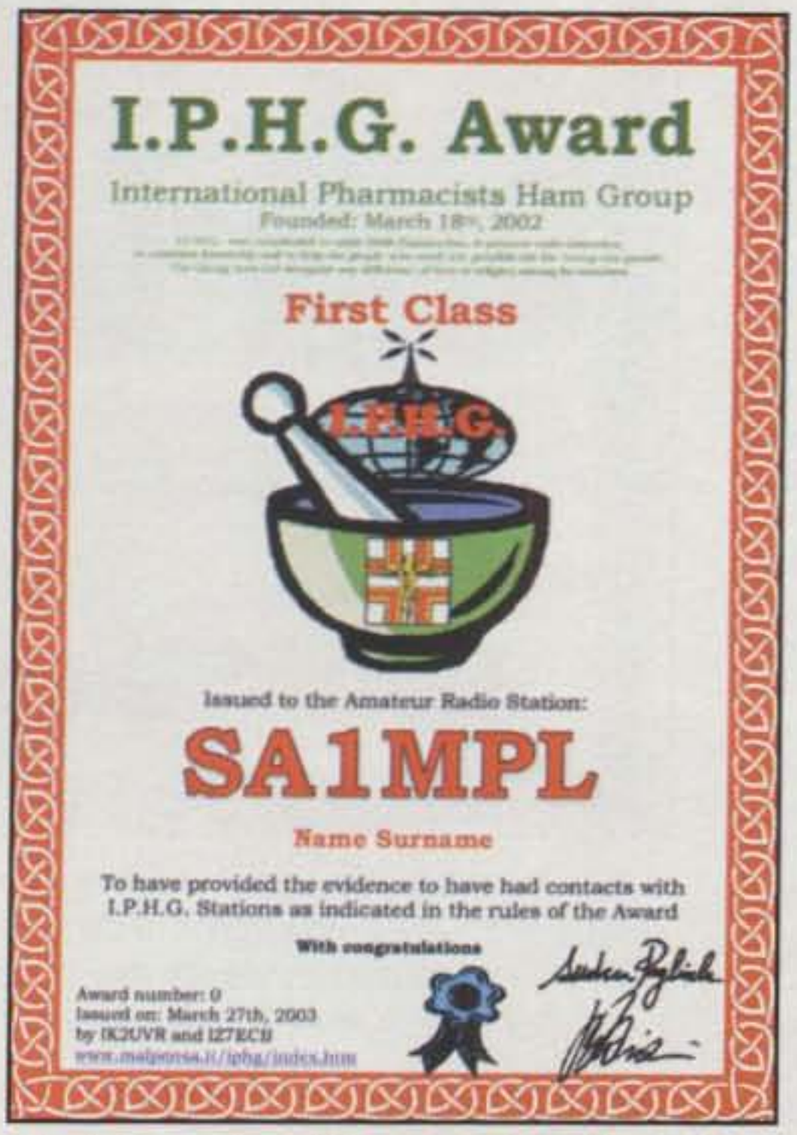
Knowing me, you can take the following statement as a prayer: God, I hope so!

Until next month… 73, Joe, N6CL

BY TED MELINOSKY,* K1BV

# A Good Direction for Award Hunting

This month's "Awards" column includes the rules for contacting members of the International Pharmacists Ham Group. Since it is a specialized interest group of pharmacists who are also amateur radio operators, the award may or may not attract your interest. However, the rules for this one solve some of the problems that sometimes make award hunting both difficult and expensive.




*The International Pharmacists Ham Group sponsors the I.P.H.G. Award for contacting pharmacists who are also hams. The rules solve some of the problems that sometimes make award hunting difficult and expensive.*

Basically, you contact the requisite number of ham pharmacists, e-mail your application to the sponsor, and receive a PDF file of the certificate which can be printed out on your printer. Talk about instant gratification! The problems solved are as followed:

a. application fee—completely eliminated.

b. sponsor cost of printing certificates—completely eliminated.

c. mailing expenses for applicant and sponsor—completely eliminated.

d. time spent waiting for receipt of certificate—reduced by about 95%.

e. time and money spent by the applicant to get QSL cards—cards aren't needed; however, many may want to obtain the cards for other purposes.

*Requirements:* Computer with an internet connection and e-mail service, color printer, the free Adobe Acrobat file reader. While the requirements are modest enough, they still may eliminate a small number of hams who do not have these tools of the technology. However, my feeling is that given the very low prices for used computers and ink-jet printers, this shouldn't be a major factor.

Congratulations to Andrea Pagliula, IZ7ECB, and Pier Luigi Anzini, IK2UVR, for leading the way. All sponsors should at least consider adopting this revolutionary technique.

*12 Wells Woods Rd., Columbia, CT 06237
e-mail: <k1bv@cq-amateur-radio.com>

## USA-CA Special Honor Roll

Frances Theisen, W9XYL
USA-CA All Counties #1067
May 27, 2003

Charles Theisen, K9IA
USA-CA All Counties #1068
May 27, 2003

David Langley. W4YDY
USA-CA All Counties #1069
May 31, 2003

## USA-CA Honor Roll

**500**

| | |
|---|---|
| W9XYL | 3243 |
| K9IA | 3244 |
| JA7KE | 3245 |
| DL7UX | 3246 |
| WAØOUE | 3247 |

**1000**

| | |
|---|---|
| W9XYL | 1631 |
| K9IA | 1632 |

**1500**

| | |
|---|---|
| W9XYL | 1360 |
| K9IA | 1361 |

**2000**

| | |
|---|---|
| W9XYL | 1259 |
| K9IA | 1260 |

**2500**

| | |
|---|---|
| W9XYL | 1179 |
| K9IA | 1180 |

**3000**

| | |
|---|---|
| W9XYL | 1089 |
| K9IA | 1090 |

The total number of counties for credit for the United States of America Counties Award is 3077. The basic award fee for subscribers is $6.00. For nonsubscribers it is $12.00. To qualify for the special subscriber rate, please send a recent CQ mailing label with your application. Initial application may be submitted in the USA-CA Record Book, which may be obtained from CQ Magazine, 25 Newbridge Road, Hicksville, NY 11801 USA for $2.50, or by a PC-printed computer listing which is in alphabetical order by state and county within the state. To be eligible for the USA-CA Award, applicants must comply with the rules of the program as set forth in the revised USA-CA Rules and Program dated June 1, 2000. A complete copy of the rules may be obtained by sending an SASE to Ted Melinosky, K1BV, 12 Wells Woods Road, Columbia, CT 06237 USA. DX stations must include extra postage for airmail reply.

## Fran Theisen, W9XYL, USA-CA #1067
## Charles Theisen, K9IA, USA-CA #1068

The following was written by Charles, K9IA. Both he and his XYL Fran, W9XYL, were awarded USA-CA All Counties on May 27, 2003.

I was first licensed as KN9QYC in 1958. I remember my first encounter with amateur radio. It was in 1947 and I was six years old. I was introduced to ham radio by my cousin Bob, who doesn't have a clue that he is to blame. What was his call? I don't know. I'll bet he doesn't either. Just out of high school, he was showing some friends his station. I sensed that little kids weren't really welcome, and since I was a little kid and he was a big kid, I stayed out of sight and watched in amazement from a safe distance. I remember thinking that some day I wanted to be a ham operator just like Cousin Bob.

It took eleven years, but I made it, and what a thrill it was. I built my own Heathkit AR-3 and DX-35, and I was in tall clover. It didn't take long to discover the shortcomings of the receiver. I replaced the AR3 with a Hallicrafters SX-101. It took three men and a horse to haul that thing down to the shack, but it was worth it. What a year that was.

Four years in college put ham radio on the back burner—and then a new job and family. It's funny how spouse influence has a tendency to stifle ham radio. I remember the days when Fran had absolutely no use for radio stuff. That went on for years. One time she removed the fuse from the fuse holder in my Galaxy V. It took me quite a while to figure out why the darn thing wouldn't work. Have I established the fact that W9XYL didn't really cotton to ham radio back then?

I worked for the phone company in North Dakota in the '60s. We lived in places such as Kindred and Lamoure. We moved a lot in those days. I have always wondered what folks thought when they discovered all those wires buried in their backyards after we left and someone else moved in.

In 1973 we moved back to Wisconsin and opened a hardware store in Appleton. There were a lot of hams in the Fox River Valley and my hamming took a turn for the better. Then it was time again for a change, and I moved my family to Door County, Wisconsin. We owned a hardware store there during the '80s. Ham radio took a back seat again. In 1990 it was back home to Fond due Lac, and what a delight it was to be within shouting distance of my old friends in the Appleton area.

For me the wonder of it all was yet to come. Fran, with her new call, W9XYL, began to take an interest in the radio. In times past, when I had 20 meters on in the car she would turn it off after about 20 minutes of what she referred to as "unbearable noise." One day, after a couple of hours of the "unbearable noise," I turned the radio off, only to have Fran quickly turn it back on. Nothing was said, but I had the sense that I was in trouble. Now all the radios belong to her. I remember how she felt about my radios when we were young.

It's a joy to watch her excitement when she works a new country. I think most of us remember the thrill of that first contact back when we were just starting out. Some say it's all downhill from there, but I have found a renewed interest in ham radio since Fran discovered what I knew all along.

Now we both are retired and we have built a radio shack on the main floor of the house. No more basement stuff for me. Good comes of everything. New rig? No problem. Fran suggested that we get the step-up model. A new tower? Let's get a higher one this time, she says. I'll bet it was more common than not, but who will admit to introducing Drake Twins with speaker console, tuner, etc., into the shack one piece at a time over a period of several weeks to avoid detection? I never did that. Not me. No way.

I don't know what happened. I really don't understand how we got to this point, but one thing I do know: I think I like it. I get to have more ham stuff, even if I don't get to call it mine.

I worked on the USA-CA Award for nine years. Fran did it in four. Actually, she really did it in five, if you count the year that she waited for me to catch up with her, but who's counting?

Fran and I would like to thank all of the great people who helped us in this endeavor. In particular, we would like to thank N8STF for going out of his way to give us our last county.

Now we are on to the second time around with this worked all counties stuff. Please know that this is not my idea. I just can't afford to be left behind, so I stay close to the radio. When W9XYL works a new county, I get it also. Just can't be left behind. I try to sneak in a few extra counties from time to time, but more often than not, I get caught. Life is just one big contest. —*K9IA*

*The newest French "department" award from the Departement de la Cote d'Or. French departments are considered akin to U.S. counties.*

## Awards and Certificates

**The DD21 Cote d'Or Department Diplome.** The newest French "department" award comes from the Departement de la Cote d'Or. Like most French awards, it is elegantly and tastefully designed to publicize some of the characteristics of the department, which can be considered to be somewhat akin to a U.S. county. You can quickly determine the French department by looking at the first two digits of the postal code on the card. Those with 21XXX are in the Cote d'Or and are valid for the award.

Contact five stations located in department 21. SWL okay. Endorsement for band or mode upon request. Use of repeaters is not allowed. Send GCR list and fee of 10 Euros or 10 IRCs to: Alain Minard, F5LIW, 20 Impasse Racine, F-21800 Chevigny-Saint-Sauveur, France.

**Russia's Flight of Friendship Award.** Did you know that in 1932 there was a long-distance, record-setting flight made between Shchelkovo (in the Moscow area) and Vancouver, Washington via the North Pole? Dmitriy Voronin, RV3DUT, sent in the rules for this award, which is handsome and colorful. It was established in 2002 in honor of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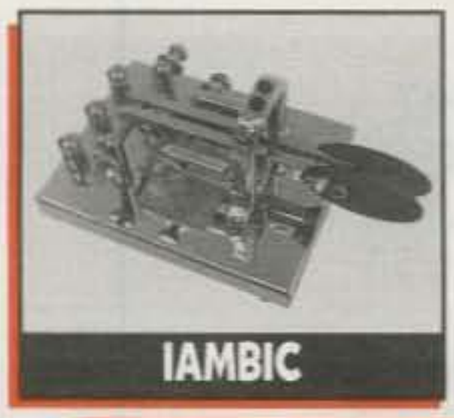
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*Russia's Flight of Friendship Award was established in honor of the 1932 long-distance, record-setting flight made between Shchelkovo (in the Moscow area) and Vancouver, Washington via the North Pole.*

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*The Summit Award is available to licensed amateur radio operators who make direct contact with radio amateurs operating from Colorado's 14,000 ft. peaks.*

the 65th anniversary flight of the crew of plane ANT-25 under the direction of V. P. Tchkalov.

To earn the award, complete one of the following requirements:

a. Make one QSO with an amateur in Shchelkovo and one QSO with Vancouver (Washington) or Portland (Oregon).

b. Earn 66 points during the period from June 16, 2003 to December 31, 2003 for QSOs with hams in Shchelkovo and the Shchelkovo area, and also members of the Armed Forces Amateur Radio Union (AFARU) and Club Fifth Ocean. Note that each successive year requires one more point, so 2004 will require 67 points, etc.

*Point Schedule:* RK3DYB 20 points; R3DPD 45 points (active June 18–20, 2003); RK3DYB, UA3DGP, RA3DPC, RD3DI, RV3DBG, RW3DIA, RV3DUT, RW3DN, UA3DJR, RZ3DFL, UA3DDH, UA3DUN, UA3FP, RZ3FB, RV3DSA, and RZ3DK (plus UE3DGQ, which will be active August 29–31, 2003) 15 points; RA3DAG, RV3DOK, RU3DKD, RW3DVQ, RU3DNN, UA3DOY, RW3FY, U3EE, UA3DT, RA3DCI, RA3DPJ, RA3DJW, UA3DHC, RK3DZB, UA3DKR, RZ3FO, U4MIR, RA3DKY, and RW3DVG 10 points. Members of the AFARU and Club Fifth Ocean count 1 point. During the period June 16–22, 2003 point values are doubled, except for the QSO with R3DPD.

Cost of the diploma: $US5, 5 Euros, or 10 IRCs; for Russia and the Ukraine $US1 or 2 IRCs; for CIS countries $US2 or 4 IRCs). Award Manager: Dmitriy Voronin, RV3DUT, Box 230, Shchyolkovo, Russia 141100 (e-mail: <rv3dut@mail.ru>). Applicants in the Ukraine should send to: Michael Konjaev, UR5ASM, u. Krasnoarmeyskaya 74-31, Akhirta-4, Sumy region, 42704 Ukraine (e-mail: <ur5asm@sm.ukrtel.net>).

**Colorado 14er Awards Series.** It seems that there is a connection between hams and mountain climbing. There are current awards from Japan, Russia, Scotland, and now the U.S. for contacting hams who make contacts as they backpack up the slopes of mountains! It's an interesting concept, and you'll be talking to some hams who are in really good shape! See <http://www.Colorado14erEvent.org> for a good explanation.

*General Requirements:* The awards are issued to promote amateur radio and back packing, hiking/climbing, and mountaintop operating. The Summit Award is available to licensed amateur

radio operators who make direct contact with radio amateurs operating from Colorado's 14,000 ft. peaks. The Pinnacle Award is available to licensed amateur radio operators who actually operate from (activate) Colorado's 14,000 ft. peaks. The official list of Colorado's 14,000 ft. ("14er") peaks includes the 54 peaks normally recognized as distinct 14,000 ft. or greater mountains, as recorded on the Colorado 14er Event website, <http://www.Colorado14erEvent.org>. Mountaintop stations must be near the actual recognized summit of the mountain, within 500 vertical feet and 1000 horizontal feet of the highest point on the mountain.

A contact requires at least the exchange of callsigns on legal ham bands. Only one contact per peak. If applying for endorsements, peak credit may be reused as long as all peaks submitted are unique. Use of terrestrial repeaters is not allowed, but contacts via satellite repeaters are allowed. Contacts must be made on or after January 1, 1990. Endorsements are available upon request for HF-only, VHF/UHF-only, band, mode, satellite, etc., at the discretion of the awards manager. QSL cards are not required. You must use the official application form available at the Colorado 14er Event website listed above. Award fee is $US5. Apply to: Paul Ermisch KBØLUR, 17506 Celestine Court, Parker, CO 80134-9171 (e-mail: <kb0lur@ arrl.net>).

*Summit Award Rules.* The Summit Award is available to stations contacting ten or more Colorado 14er peaks. Contacting stations may be based at any location and any number of locations. A "Colorado 14er Event" endorsement is available for this award recognizing ten or more peaks/contacts completed during any single annual Colorado 14er Event.

*Pinnacle Award Rules.* The Pinnacle Award is available to stations operating from five or more Colorado 14er peaks. For this award, along with the award application, activating stations must include a contact log showing contacts made during peak activation as proof of operation.

**Texas Century Club (TXCC).** The Northwest Amateur Radio Society of Houston, Texas sponsors the annual Texas QSO Party, this year scheduled for September 27–28, 2003. This annual QSO Party is a great way to fill in many missing counties, since mobiles will be criss-crossing the state giving out counties.

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*The Northwest Amateur Radio Society of Houston, Texas, which sponsors the annual Texas QSO Party, is now also sponsoring an award for working and confirming at least 100 Texas counties.*

The group is sponsoring an award for working and confirming at least 100 Texas counties on or after January 1, 1999. There are endorsements for 150, 200, 225, and 250 counties, and then something special for working all 254 counties. Endorsements are available for single band or mode or all mobile. It is available to licensed amateurs only. QSOs via repeaters, satellites, moon bounce, and phone patches may not be used. SEnd GCR list and fee of $US5 ($US2 for endorsements) to: Northwest ARS, Texas QSO Party Committee, Norm Covey, K5OS, 30603 North High Meadow Circle, Magnolia TX 77355-2167 (e-mail: <k5os@arrl.net>; on the web: <http://www.txqp.org>).

## URL of the Month

Egbert Hertsen, ON4CAS, is a long-time award hunter, and his page at <http://www.on4cas.tk/> features an excellent description of how to begin, how to get information about awards, what's available in the world of award hunting, and practical tips for the beginner. It's generously sprinkled with images and stories of awards of all kinds and is a good primer on award hunting. It is written in English and I highly recommend it.

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I'm still looking for samples and rules of your club or group's award. Publicity is the key to a successful awards program, and *CQ* magazine is an excellent way to get the word out.

73, Ted, K1BV


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# The New 60 Meter Band: A Look at This Season on 5 MHz

BY TOMAS HOOD,* NW7US

The grand opening of the new 5 MHz, 60 meter band was quite an event. Reports from many observers and participants state that everyone was courteous and helpful, using good manners and operating skill. Propagation was very good, with reports from European and Asian listeners who have been able to hear some stations from various points in the United States.

During July I was able to work from my location in western Washington State into as far away as Arkansas and Ohio. I was able to hear Florida and Hawaii. I also worked Utah, California, Idaho, Alaska, and other nearby states, as to be expected. The same night that I worked Arkansas, the station from Arkansas was able to work one of the Alaskan stations.

Summertime noise worked against the DXing efforts throughout the summer. Noise levels are seasonally decreasing, making for some very hot DXing on 60 meters during September and the following months. One technique that might prove effective on 60 meters is if stations employ high-gain receiving antennas, while ensuring that the transmitting power level remains within legal limits. For instance, I am building some Beverage receiving antennas, hoping that I can pull in the weaker signals. However, I will continue to use one of the dipoles when transmitting, making sure not to exceed the power-level limits. If you are able to add a high-gain receiving antenna to your 60 meter configuration, we will be better able to hear one another.

What can be expected on 60 meters this month? I've been doing a lot of analysis with several different programs (ACE-HF <http://www.acehf.com>, WinCap Wizard 3 <http://www.taborsoft.com/wwizard3/>, W6ELprop <http://www.qsl.net/w6elprop/>, and several others) to see first what the models would reveal for July (to see how the real world results compared to the computerized results), and then second, to forecast conditions for September 2003. I set the parameters to 50 watts of power into a 0 dB gain horizontal dipole (for both sides of the radio path) and used the smoothed sunspot numbers for July as well as September.

For the July analysis, I decided to create a movie using ACE-HF, for a 24-hour period, with 20% reliability. It was interesting to see that the footprint of my signal was best in the late afternoon, increasing in distance through the evening, peaking right before midnight, and then becoming shorter as morning approached. The footprint did not show my signal making it as far as Arkansas or Ohio, within the signal-to-noise (SNR) ratio of 48 dB-Hz that is the default for SSB communications in ACE-HF. In the real world, of course, it was found that I could make the contact with both Arkansas and Ohio.

Using WinCap Wizard 3, I created some tables to view the windows of possible openings between various locations around the United States. Again, the tables indicated that openings were not going to happen between more distant stations and my location. However, looking at the graphs for different paths, times were revealed that held potential for a rare opening, if conditions were optimal. Fig. 1 shows a sample graph created by WinCap Wizard 3 between my location and Little Rock, Arkansas for July 2003. While it shows that the signals never rise above the SNR floor, it clearly shows that it might be possible to work Arkansas during those peaks of 11 PM and 1 AM and again at 3 AM. This was true. My Arkansas QSO was after 11 PM. Fig. 2 shows the same path for September 2003. The window looks to be opening by 10 PM, but really peaking around 5 AM, closing quickly by 7 AM.

Using W6ELprop, analyzing the path between Cleveland, Ohio and my location for July 2003, with a smoothed sunspot number of 51, the signal levels start to become usable at 0300 UTC, peaking at 59 dB above the minimum between 0500 and 0930 UTC. Again, this proved consistent with my real-world contact with the station in Ohio.

Using any of these programs for your specific location will prove useful in planning your DX efforts on 60 meters. It seems that for a lot of the locations I analyzed, the times to operate are just before the hours of darkness, through to the hours just after sunrise. This follows closely with 40 and 80 meter propagation. Days with low geomagnetic activity and low noise are days of optimal DX opportunity. Check the Last-Minute Forecast at the beginning of this column for days of High to Above Normal conditions for those days when conditions should be best on 60 meters. I would like to hear your reports of your 60 meter observations. What

*P.O. Box 213, Brinnon, WA 98320-0213
e-mail: <cq-prop-man@hfradio.org>

## LAST-MINUTE FORECAST

**Day-to-Day Conditions Expected for September 2003**

| Propagation Index..... | Expected Signal Quality (4) | (3) | (2) | (1) |
|---|---|---|---|---|
| Above Normal: 1-3, 28-30 | A | A | B | C |
| High Normal: 6-7, 10, 12-13, 15-16, 20-23, 25-27 | A | B | C | C-D |
| Low Normal: 8, 11, 17, 19, 24 | B | C-B | C-D | D-E |
| Below Normal: 14, 18 | C | C-D | D-E | E |
| Disturbed: 4-5, 9 | C-D | D | E | E |

*Where expected signal quality is:*

A—Excellent opening, exceptionally strong, steady signals greater than S9.

B—Good opening, moderately strong signals varying between S6 and S9, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S6, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, with considerable fading and noise.

E—No opening expected.

### HOW TO USE THIS FORECAST

1. Find the *propagation index* associated with the particular path opening from the Propagation Charts appearing on the following pages.
2. With the *propagation index,* use the above table to find the expected signal quality associated with the path opening for any given day of the month. For example, an opening shown in the Propagation Charts with a *propagation index* of 3 will be excellent (A) on September 1–3, poor (D) on the 4–5, good (B) on the 6–7, and so on.

are the farthest contacts you have made? What times seem to work best? Include details about your antenna, the other person's working conditions, and the general conditions of the band (noise levels, and so forth). I'll also work on some additional prediction charts for late fall and winter 60 meter operation.

## Current Solar Cycle Progress

The Royal Observatory of Belgium, the world's official keeper of sunspot records, reports an observed monthly mean sunspot number of 77 for June 2003, compared with 89 for June 2002. This is up, however, from May's 55. The 12-month running smoothed sunspot number centered on December 2002 is 82, compared to 115 for December 2001, and only a few points down from November. The sunspot low for June 2003 was 38 on June 2. The sunspot high of 116 occurred on June 11.

The Dominion Radio Astrophysical Observatory at Penticton, BC, Canada, reports a 10.7 cm observed monthly mean solar flux of 129 for June 2003, compared to 149 for June 2001. This is up from May's 116. The 12-month smoothed 10.7 cm flux centered on December 2002 is 151, down from the 194 of December 2001. This is down several points from November 2002.

The observed monthly mean *Ap*-index for June 2003 is 24, considerably higher than the *Ap* of 11 for June 2002. The12-month smoothed *Ap*-index centered on December 2002 is 17, up from December 2001's smoothed *Ap* of 12.

A smoothed sunspot level of 51 and a 10.7 cm solar flux of about 106 are predicted for September 2003. The geomagnetic planetary *A*-index (*Ap*) will rise a bit this month and through October, before slowly decreasing through the winter season. Overall, though, I predict a slow decline of the *Ap* until the the cycle's minimum.

## September Propagation

With the 10.7 cm flux levels ranging from the 30s to over 100 this month, propagation on 10 through 20 meters will vary greatly. Some days conditions will continue to be much as they were during the summer. Other days (and more often) conditions will be more like those experienced during the winter season.

The 10 meter DX season is starting to open up, and by the end of September will open daily, especially between North and South America. Paths to Europe and the South Pacific, as well as Asia, are possible and will occur on days of High Normal and better conditions. However, we are now well into the decline of the current sunspot cycle, so these openings will be more rare than in the last few years. Conditions may be marginal during the month, but the band is certainly coming alive. There will be less polar propagation as we move toward winter, though, making some parts of the world difficult over these paths. To catch the openings over high latitudes, get on the band shortly after sunrise, or watch for polar signals as the band closes for the evening. Twelve meters will experience much of the same conditions that exist on 10.

The 15 meter band will usually supply day-path propagation even over the polar paths, although these will become more rare than during peak cycle years. Watch 15 for many long-path opportuni-

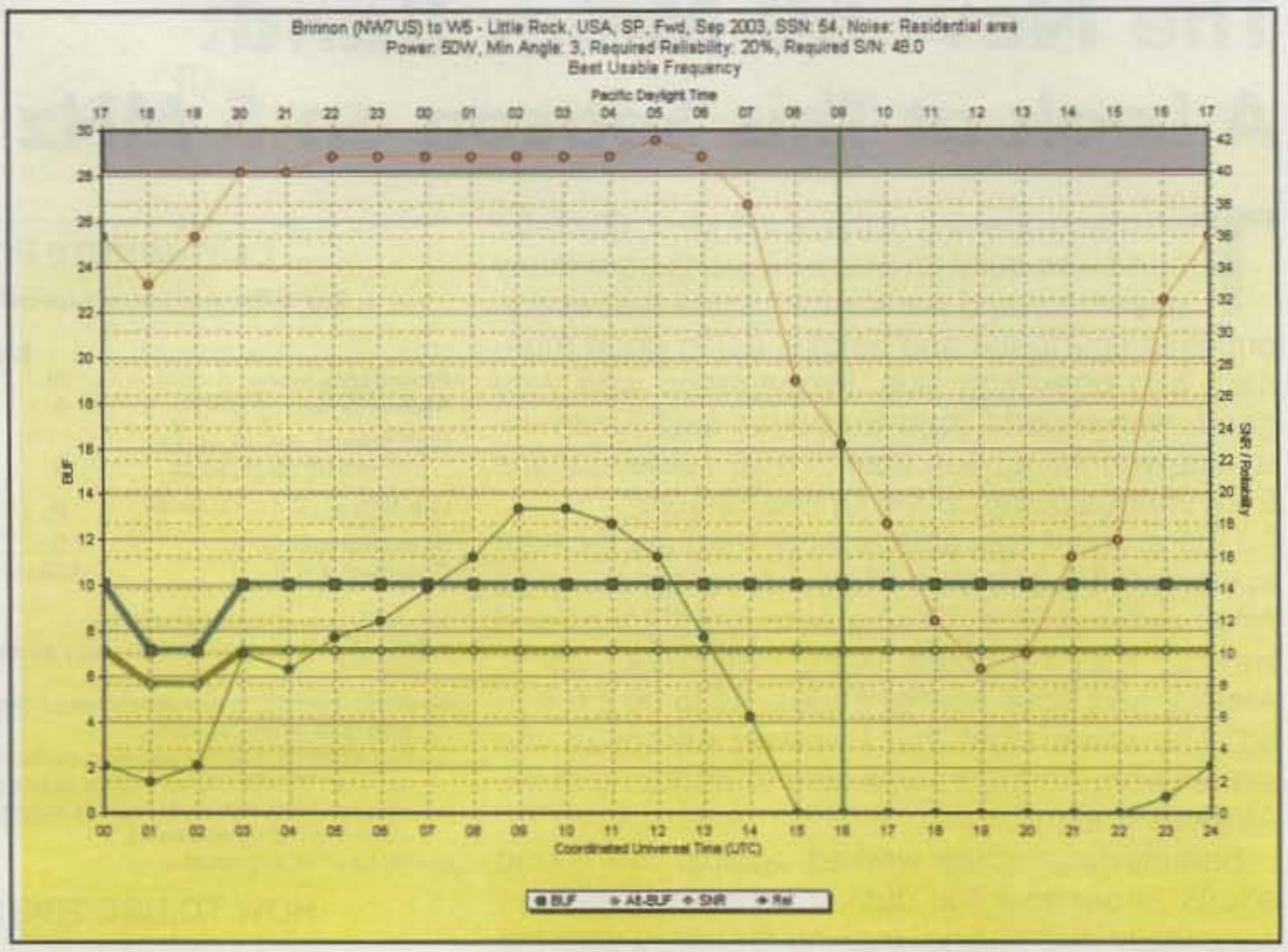


*Fig. 1– Sample graph created by WinCap Wizard 3 between my location (Brinnon, Washington) and Little Rock, Arkansas for July 2003.*

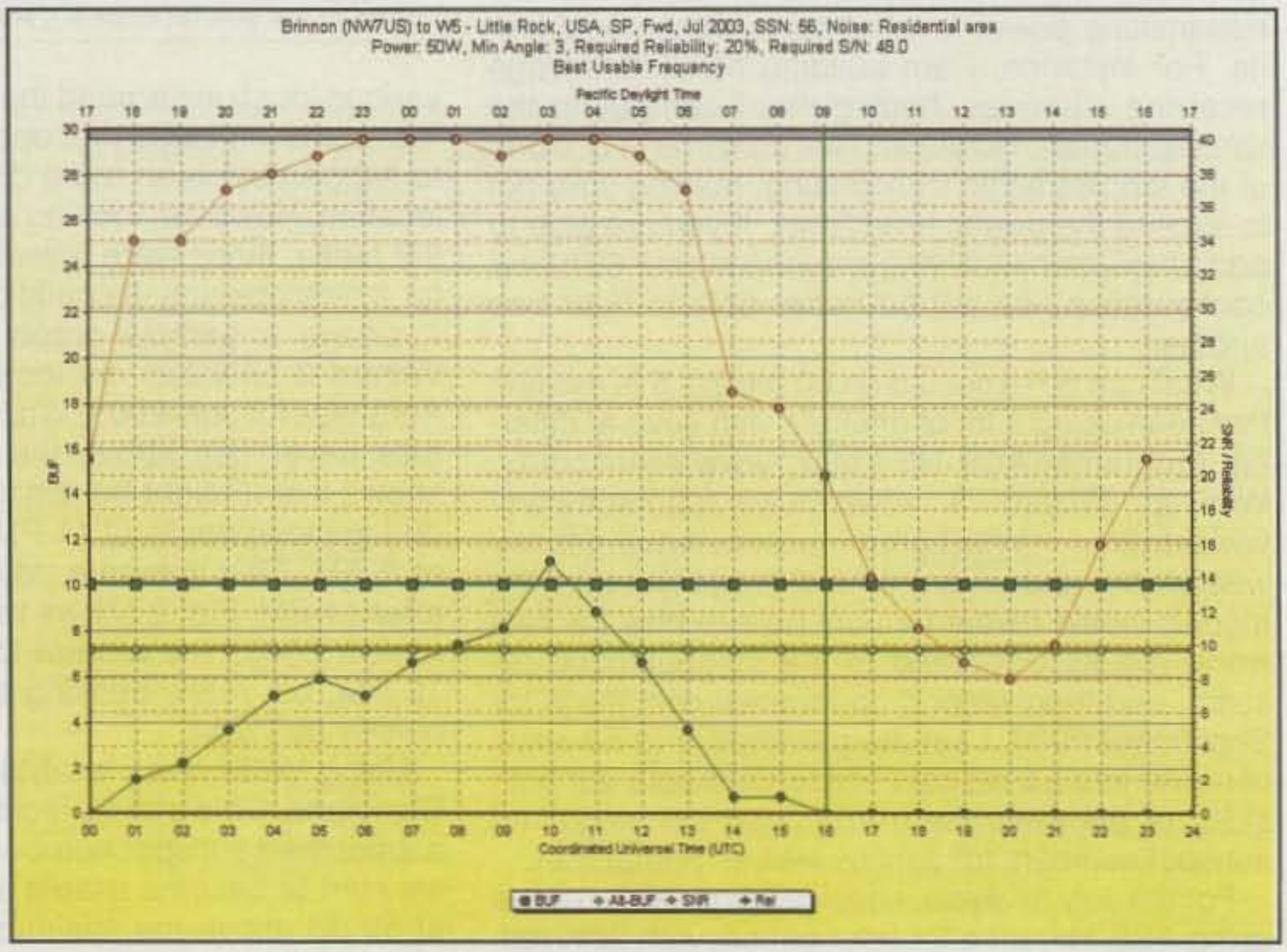


*Fig. 2– The same path as shown in fig. 1, but for September 2003.*

ties. A considerable improvement is expected for DX propagation on both 15 and 17 meters, both opening shortly after sunrise and remaining open until after sundown. However, 15 will not stay open late into the night like it will during the spring season. Openings should be possible to all areas of the world, with conditions best toward Europe and the northeast before noon, and to the rest of the world during the afternoon hours. Openings toward the South Pacific, Australia, New Zealand, and the Far East should be possible well into the early evening, particularly when propagation conditions are High or better.

Twenty meters will be the best daytime DX band this month. Look for 20 to open for DX at sunrise and remain open in all directions for a few hours. It should be possible to work into many areas of the world throughout the daylight hours, with a peak in the afternoon. Nighttime conditions will favor openings toward the south and to tropical areas, but some openings will also be possible to other areas, especially during High Normal or better days. Look for polar gray-line propagation into Asia. Long-path is common on 20 to southern Asia, the Middle East, and northeastern Africa, as well as the Indian Ocean region, via the North Polar path.

Expect an improvement in nighttime DX conditions on 30 through 160 meters during September and October. This is due to the increasing hours of darkness and a seasonal decrease in the static level. Thirty and 40 meters should be best for worldwide DX from sunset to sunrise. Sixty meters should become more reliable for those farther contacts. Working all states on 60 is very possible during this season. Eighty and 160 meters will become hot bands during the hours of darkness, especially for an hour or so before local sunrise.

For short-skip propagation during September and early October, use 60 and 80 meters during the day for openings shorter than 250 miles, and either 80 or 160 meters at night. For distances between 250 and 750 miles, try 30, 40, and possibly 60 meters during the day and 80 meters at night. For openings between 750 and 1300 miles, 20 meters should work during the day; 30, 40, and 60 from sundown to midnight; and 60 and 80 from midnight to sunrise. For openings greater than 1300 miles, try 15, 17, and 20 meters during the day, and 30, 40, and even 60 meters during the hours of darkness. Check 10 and 12 meters for some fairly good openings beyond 1300 miles in the afternoon hours, especially when conditions are

### HOW TO USE THE SHORT-SKIP CHARTS

1. In the Short-Skip Chart, the predicted times of openings can be found under the appropriate distance column of a particular meter band (10 through 160 meters) as shown in the left-hand column of the chart. For the Alaska and Hawaii Charts the predicted times of openings are found under the appropriate meter band column (15 through 80 meters) for a particular geographical region of the continental USA as shown in the left-hand column of the charts. An * indicates the best time to listen for 160 meter openings. An ** indicates possible 10 meter openings.

2. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. In the Short-Skip Chart, where two numerals are shown within a single set of parentheses, the first applies to the shorter distance for which the forecast is made, and the second to the greater distance. The index indicates the number of *days* during the month on which the opening is expected to take place, as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last-Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific *propagation index* is likely to occur, and the signal quality that can be expected.

3. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 AM; 13 is 1 PM, etc. On the Short-Skip Chart appropriate *daylight* time is used at the path midpoint. For example on a circuit between Maine and Florida, the time shown would be EDT, on a circuit between New York and Texas, the time at the midpoint would be CDT, etc. Times shown in the Hawaii Chart are in HST. To convert to daylight time in other USA time zones add 3 hours in the PDT zone; 4 hours in the MDT zone; 5 hours in the CDT zone; and 6 hours in the EDT zone. Add 10 hours to convert from HST to GMT. For example, when it is 12 noon in Honolulu, it is 15 or 3 PM in Los Angeles; 18 or 6 PM in Washington, D.C.; and 22 GMT. Time shown in the Alaska Chart is given in GMT. To convert to *daylight* time in other areas of the USA subtract 7 hours in the PDT zone; 6 hours in the MDT zone; 5 hours in the CDT zone; and 4 hours in the EDT zone. For example, at 20 GMT it is 16 or 4 PM in New York City.

4. The Short-Skip Chart is based upon a transmitted power of 75 watts CW or 300 watts PEP on sideband; the Alaska and Hawaii Charts are based upon a transmitter power of 250 watts CW or 1 KW PEP on sideband. A dipole antenna a quarter-wavelength above ground is assumed for 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

5. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado 80302.

## CQ Short-Skip Propagation Chart
## September & October 2003
## Band Openings Given In
## Local Standard Time
## At Path Mid-Point
## (24-Hour Time System)

| *Band (Meters)* | *Distance From Transmitter (Miles)* | | | |
|---|---|---|---|---|
| | *50-250* | *250-750* | *750-1300* | *1300-230* |
| 10 | Nil | 10-21 (0-1) | 08-10 (1)<br>10-13 (1-2)<br>13-15 (1-3)<br>15-16 (1-2)<br>16-21 (0-1) | 08-10 (1)<br>10-13 (2)<br>13-15 (3)<br>15-16 (2-3)<br>16-17 (1-2)<br>17-19 (1)<br>19-21 (1-0) |
| 15 | Nil | 08-10 (0-1)<br>10-15 (0-2)<br>15-21 (0-1) | 08-09 (1)<br>09-10 (1-2)<br>10-15 (2-4)<br>15-17 (1-4)<br>17-18 (1-3)<br>18-20 (1-2)<br>20-21 (1)<br>21-08 (0-1) | 08-09 (1)<br>09-10 (2-3)<br>10-11 (4-3)<br>11-17 (4)<br>17-18 (3)<br>18-19 (2-3)<br>19-20 (2)<br>21-08 (1-0) |
| 20 | 12-14 (0-1)<br>14-16 (0-2)<br>16-22 (0-1) | 08-09 (0-1)<br>09-10 (1-2)<br>10-11 (0-3)<br>11-12 (1-4)<br>12-14 (1-4)<br>14-16 (2-4) | 06-08 (1-2)<br>08-09 (1-3)<br>09-10 (2-4)<br>10-11 (3-4)<br>11-18 (4)<br>18-19 (3-4) | 06-08 (2)<br>08-09 (3)<br>09-14 (4-2)<br>14-16 (4-3)<br>16-19 (4)<br>19-21 (3-4) |
| | | 16-18 (1-4)<br>18-19 (1-3)<br>19-22 (1-2)<br>22-08 (0-1) | 19-22 (2-3)<br>22-00 (1-2)<br>00-06 (1) | 21-22 (3)<br>22-23 (2-3)<br>23-00 (2)<br>00-06 (1) |
| 40 | 08-10 (1-3)<br>10-12 (2-4)<br>12-18 (3-4)<br>18-19 (2-3)<br>19-21 (1-2)<br>21-06 (0-1)<br>06-08 (0-2) | 08-10 (3-4)<br>10-12 (4-3)<br>12-16 (4-2)<br>16-18 (4-3)<br>18-19 (3-4)<br>19-21 (2-4)<br>21-23 (1-4)<br>23-03 (1-3)<br>03-06 (1-2)<br>06-08 (2-3) | 08-10 (4-2)<br>10-12 (3-1)<br>12-16 (2-1)<br>16-18 (3-2)<br>18-19 (4-2)<br>19-20 (4-3)<br>20-23 (4)<br>23-03 (3-4)<br>03-06 (2-3)<br>06-08 (3-4) | 08-10 (2-1)<br>10-16 (1-0)<br>16-18 (2-1)<br>18-19 (2)<br>19-20 (3)<br>20-21 (4-3)<br>21-03 (4)<br>03-05 (3-4)<br>05-06 (3)<br>06-08 (4-3) |
| 80 | 07-09 (3-4)<br>09-12 (4)<br>12-19 (4-3)<br>19-23 (4)<br>23-05 (3-4)<br>05-07 (2-3) | 07-09 (4-2)<br>09-12 (4-1)<br>12-17 (3-1)<br>17-19 (3-2)<br>19-21 (4-3)<br>21-05 (4)<br>05-06 (3-4)<br>06-07 (3) | 07-09 (2-1)<br>09-17 (1-0)<br>17-19 (2-1)<br>19-21 (3-2)<br>21-22 (4-3)<br>22-04 (4)<br>04-06 (4-3)<br>06-07 (3-2) | 07-09 (1)<br>09-17 (0)<br>17-19 (1)<br>19-21 (2)<br>21-22 (3-2)<br>22-04 (4-3)<br>04-06 (3-2)<br>06-07 (2-1) |
| 160 | 17-19 (1-0)<br>19-21 (2-1)<br>21-06 (4)<br>06-08 (3-2)<br>08-10 (2-1)<br>10-12 (1-0) | 18-20 (1-0)<br>20-21 (1)<br>21-03 (4-3)<br>03-06 (3-2)<br>06-08 (2-1)<br>08-10 (1-0) | 20-21 (1-0)<br>21-23 (3-1)<br>23-03 (3)<br>03-06 (2-1)<br>06-08 (1) | 21-23 (1-0)<br>23-03 (3-2)<br>03-06 (1)<br>06-08 (1-0) |

## HAWAII
## September & October 2003
## Openings Given in GMT #

| *To:* | *10 Meters* | *15 Meters* | *20 Meters* | *40/80 Meters* |
|---|---|---|---|---|
| Eastern USA | 08-10 (1)<br>10-13 (2)<br>13-14 (1) | 067-11 (1)<br>11-12 (2)<br>12-14 (3)<br>14-15 (2)<br>15-16 (1) | 11-13 (1)<br>13-14 (2)<br>14-18 (3)<br>18-20 (2)<br>20-04 (1)<br>04-07 (2)<br>07-08 (1) | 18-20 (1)<br>20-22 (2)<br>22-00 (3)<br>00-02 (2)<br>02-03 (1)<br>10-21 (1)*<br>21-00 (2)*<br>00-01 (1)* |
| Central USA | 08-10 (1)<br>10-14 (2)<br>14-16 (1) | 07-10 (1)<br>10-12 (2)<br>12-16 (3)<br>16-17 (2)<br>17-18 (1) | 09-13 (1)<br>13-14 (2)<br>14-15 (3)<br>15-18 (4)<br>18-19 (3)<br>19-21 (2)<br>21-04 (1)<br>04-09 (2) | 18-20 (1)<br>20-22 (2)<br>22-02 (3)<br>02-04 (2)<br>04-05 (1)<br>19-21 (1)*<br>21-00 (2)*<br>00-02 (1)* |
| Western USA | 08-09 (1)<br>09-10 (2)<br>10-15 (3)<br>15-16 (2)<br>16-17 (1) | 07-09 (1)<br>09-10 (2)<br>10-13 (3)<br>13-15 (4)<br>15-16 (3)<br>16-17 (2)<br>17-19 (1) | 10-12 (2)<br>12-14 (3)<br>14-18 (4)<br>18-20 (3)<br>20-00 (2)<br>00-05 (1)<br>05-06 (2)<br>06-10 (3) | 18-19 (1)<br>19-20 (2)<br>20-02 (4)<br>02-04 (3)<br>04-05 (2)<br>05-06 (1)<br>19-20 (1)*<br>20-22 (2)*<br>22-02 (3)*<br>02-04 (2)*<br>04-05 (1)* |

## ALASKA
## September & October 2003
## Openings Given in GMT #

| *To:* | *10 Meters* | *15 Meters* | *20 Meters* | *40/80 Meters* |
|---|---|---|---|---|
| Eastern USA | 19-22 (1) | 17-19 (1)<br>19-23 (2)<br>23-00 (1) | 12-15 (1)<br>18-21 (1)<br>21-23 (2)<br>23-01 (3)<br>01-02 (2)<br>02-04 (1) | 08-12 (1) |
| Central USA | 20-00 (1) | 17-19 (1)<br>19-21 (2)<br>21-23 (3)<br>23-01 (2)<br>01-02 (1) | 13-22 (1)<br>22-00 (2)<br>00-03 (3)<br>03-04 (2)<br>04-06 (1) | 08-11 (1)<br>11-13 (2)<br>13-14 (1)<br>11-13 (1)* |
| Western USA | 20-22 (1)<br>22-01 (2)<br>01-02 (1) | 18-21 (1)<br>21-22 (2)<br>22-00 (4)<br>00-01 (3)<br>01-02 (1)<br>02-03 (1) | 16-18 (1)<br>18-20 (3)<br>20-00 (2)<br>00-02 (3)<br>02-03 (4)<br>03-04 (3)<br>04-05 (2)<br>05-07 (1) | 08-11 (1)<br>11-14 (2)<br>14-16 (1)<br>11-14 (1)* |

## HOW TO USE THE DX PROPAGATION CHARTS

1. Use chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4, and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9, and 0 areas; the Western USA Chart in the 6 and 7 areas; and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (10 through 80 meters) for a particular DX region, as shown in the left-hand column of the charts. An * indicates the best time to listen for 160 meter openings.

3. The propagation index is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of days during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this column for the actual dates on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

4. Times shown in the charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M.; 13 is 1 P.M., etc. Appropriate *daylight* time is used, not GMT. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

5. The charts are based upon a transmitted power of 250 watts CW, or 1 kw, PEP on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, and a half-wavelength above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 dB gain above these reference levels, the *propagation index* will increase by one level; for each 10 dB loss, it will lower by one level.

6. Propagation data contained in the charts has been prepared from basic data published by the Institute for Telecommunication Sciences of the U.S. Dept of Commerce, Boulder, Colorado 80302.

## September 15 - October 15, 2003
## Time Zone: EDT (24-Hour Time)
## EASTERN USA To:

| *Reception Area* | *10 Meters* | *15 Meters* | *20 Meters* | *40/80 Meters* |
|---|---|---|---|---|
| Western & Central Europe & North Africa | 09-11 (1)<br>11-12 (2)<br>12-14 (1) | 08-09 (1)<br>09-11 (2)<br>11-14 (4)<br>14-15 (3)<br>15-16 (2)<br>16-17 (1) | 03-04 (1)<br>04-06 (2)<br>06-10 (3)<br>10-12 (2)<br>12-15 (3)<br>15-17 (4)<br>17-19 (3)<br>19-20 (2)<br>20-21 (1) | 18-19 (1)<br>19-21 (2)<br>21-23 (3)<br>23-02 (4)<br>02-03 (3)<br>03-04 (2)<br>04-05 (1)*<br>20-22 (1)*<br>22-01 (2)*<br>01-04 (1)* |
| Northern Europe & European CIS | 09-12 (1) | 08-09 (1)<br>09-10 (2)<br>10-12 (3)<br>12-13 (2)<br>13-15 (1) | 03-06 (1)<br>06-08 (2)<br>08-11 (3)<br>11-13 (2)<br>13-17 (3)<br>17-18 (2)<br>18-20 (1) | 18-20 (1)<br>20-04 (2)<br>04-06 (1)<br>21-04 (1)* |
| Eastern Mediter-ranean & Middle East | 10-13 (1) | 08-09 (1)<br>09-12 (2)<br>12-14 (3)<br>14-16 (2)<br>16-17 (1) | 07-09 (2)<br>09-15 (1)<br>15-17 (2)<br>17-20 (3)<br>20-21 (2)<br>21-23 (1)<br>23-01 (2)<br>01-07 (1) | 19-21 (1)<br>21-00 (2)<br>00-01 (1)<br>22-23 (1)* |
| Western Africa | 11-13 (1)<br>13-14 (2)<br>14-16 (3)<br>16-17 (2)<br>17-18 (1) | 07-09 (1)<br>09-13 (2)<br>13-15 (3)<br>15-17 (4)<br>17-18 (3)<br>18-19 (2)<br>19-20 (1) | 05-08 (2)<br>08-15 (1)<br>15-17 (2)<br>17-18 (3)<br>18-21 (4)<br>21-23 (3)<br>23-03 (2)<br>03-05 (1) | 20-23 (1)<br>23-02 (2)<br>02-04 (1)<br>00-03 (1)* |
| Eastern & Central Africa | 13-15 (1)<br>15-17 (2)<br>17-18 (1) | 08-09 (1)<br>09-13 (2)<br>13-15 (3)<br>15-17 (4)<br>17-18 (3)<br>18-19 (2)<br>19-20 (1) | 12-14 (1)<br>14-17 (2)<br>17-21 (3)<br>21-01 (2)<br>01-02 (1) | 20-02 (1)<br>00-01 (1)* |
| Southern Africa | 09-11 (1)<br>11-13 (2)<br>13-14 (1) | 08-11 (1)<br>11-12 (2)<br>12-13 (3)<br>13-15 (4)<br>15-16 (3)<br>16-17 (2)<br>17-18 (1) | 14-16 (1)<br>16-19 (2)<br>19-23 (3)<br>23-01 (2)<br>01-02 (1)<br>06-08 (1) | 19-22 (1)<br>22-00 (2)<br>00-02 (1)<br>23-01 (1)* |
| Central & South Asia | 09-11 (1)<br>19-21 (1) | 09-10 (1)<br>10-12 (2)<br>12-13 (1)<br>20-22 (1) | 07-08 (1)<br>08-10 (2)<br>10-12 (1)<br>17-19 (1)<br>19-22 (2)<br>22-00 (1) | 05-07 (1)<br>20-23 (1) |
| Southeast Asia | 11-13 (1)<br>18-20 (1) | 09-11 (1)<br>14-16 (1)<br>18-19 (1)<br>19-20 (2)<br>20-21 (1) | 06-07 (1)<br>07-10 (2)<br>10-12 (1)<br>15-18 (1)<br>20-21 (1)<br>21-23 (2)<br>23-01 (1) | 06-08 (1) |
| Far East | 18-20 (1) | 10-12 (1)<br>16-18 (1)<br>18-20 (2)<br>20-21 (1) | 07-08 (1)<br>08-10 (2)<br>10-12 (1)<br>17-20 (1)<br>20-22 (2)<br>22-00 (1) | 05-08 (1)<br>18-19 (1)<br>06-07 (1)* |
| South Pacific & New Zealand | 09-15 (1)<br>15-17 (2)<br>17-19 (3)<br>19-20 (2)<br>20-21 (1) | 09-14 (1)<br>14-18 (2)<br>18-20 (3)<br>20-21 (2)<br>21-22 (1) | 08-10 (3)<br>10-12 (2)<br>12-20 (1)<br>20-23 (2)<br>23-03 (3)<br>03-07 (1) | 01-02 (1)<br>02-03 (2)<br>03-06 (3)<br>06-08 (2)<br>08-09 (1)<br>03-05 (1)*<br>05-07 (2)*<br>07-08 (1)* |
| Australasia | 10-12 (1)<br>16-17 (1)<br>17-19 (2)<br>19-20 (1) | 09-11 (1)<br>14-17 (1)<br>17-18 (2)<br>18-20 (3)<br>20-21 (2)<br>21-22 (1) | 07-09 (2)<br>09-11 (13)<br>11-13 (2)<br>13-16 (1)<br>16-18 (2)<br>18-21 (1)<br>21-23 (2)<br>23-01 (3)<br>01-03 (2)<br>03-07 (1) | 02-04 (1)<br>04-06 (2)<br>06-07 (3)<br>07-08 (2)<br>08-09 (1)<br>04-05 (1)*<br>05-06 (2)*<br>06-07 (1)* |
| Caribbean, Central America & Northern Countries of South America | 10-11 (1)<br>11-14 (2)<br>14-17 (4)<br>17-18 (2)<br>18-19 (1) | 08-09 (1)<br>09-10 (2)<br>10-13 (3)<br>13-18 (4)<br>18-19 (3)<br>19-20 (2)<br>20-21 (1) | 04-06 (1)<br>06-07 (2)<br>07-08 (3)<br>08-10 (4)<br>10-15 (2)<br>15-17 (3)<br>17-22 (4)<br>22-03 (3)<br>03-04 (2) | 19-20 (1)<br>20-21 (2)<br>21-04 (4)<br>04-06 (3)<br>06-07 (2)<br>07-08 (1)<br>21-23 (1)*<br>23-04 (2)*<br>04-06 (1)* |
| Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay | 09-10 (1)<br>10-12 (2)<br>12-14 (1)<br>14-15 (2)<br>15-17 (4)<br>17-18 (3)<br>18-19 (1) | 08-09 (1)<br>09-11 (2)<br>11-14 (1)<br>14-16 (2)<br>16-17 (3)<br>17-19 (4)<br>19-20 (3)<br>20-21 (2)<br>21-22 (1) | 11-16 (1)<br>16-17 (2)<br>17-20 (3)<br>20-01 (4)<br>01-03 (3)<br>03-04 (2)<br>04-07 (1)<br>07-08 (2)<br>08-10 (3)<br>10-11 (2) | 21-00 (1)<br>00-05 (2)<br>05-07 (1)<br>01-06 (1)* |
| McMurdo Sound, Antarctica | 16-18 (1) | 12-15 (1)<br>15-18 (2)<br>18-19 (3)<br>19-20 (2)<br>20-21 (1) | 16-18 (1)<br>18-21 (2)<br>21-23 (3)<br>23-01 (2)<br>01-03 (1)<br>07-09 (1) | 23-01 (1)<br>01-05 (2)<br>04-06 (1)<br>04-06 (1)* |

## Time Zones: CDT & MDT
## (24-Hour Time)
## CENTRAL USA To:

| *Reception Area* | *10 Meters* | *15 Meters* | *20 Meters* | *40/80 Meters* |
|---|---|---|---|---|
| Western & Central Europe & North Africa | 09-12 (1) | 08-10 (1)<br>10-11 (2)<br>11-13 (3)<br>13-14 (2)<br>14-16 (1) | 06-07 (1)<br>07-10 (2)<br>10-13 (1)<br>13-14 (2)<br>14-16 (4)<br>16-17 (3)<br>17-20 (2)<br>20-23 (1) | 18-20 (1)<br>20-23 (2)<br>23-01 (3)<br>01-02 (2)<br>02-03 (1)<br>21-23 (1)*<br>23-01 (2)*<br>01-02 (1)* |
| Northern Europe & CIS | 09-11 (1) | 08-10 (1)<br>10-12 (2)<br>12-14 (1) | 06-07 (1)<br>07-10 (2)<br>10-12 (1)<br>12-13 (2)<br>13-15 (3)<br>15-16 (2)<br>16-18 (1)<br>20-01 (1) | 20-23 (1)<br>23-01 (2)<br>01-02 (1)<br>22-01 (1)* |
| Eastern Mediter-ranean & Middle East | 10-12 (1) | 08-10 (1)<br>10-13 (2)<br>13-14 (1) | 06-07 (1)<br>07-09 (2)<br>09-15 (1)<br>15-18 (2)<br>18-21 (1)<br>21-23 (2)<br>23-00 (1) | 20-23 (1)<br>21-23 (1)* |
| Western Africa | 11-13 (1)<br>13-15 (2)<br>15-17 (1) | 07-10 (1)<br>10-13 (2)<br>13-15 (3)<br>15-17 (4)<br>17-18 (2)<br>18-19 (1) | 05-06 (1)<br>06-08 (2)<br>08-15 (3)<br>15-17 (2)<br>17-18 (3)<br>18-19 (4)<br>19-22 (3)<br>22-00 (2)<br>00-01 (1) | 20-23 (1)<br>23-01 (2)<br>01-02 (1)<br>23-01 (1)* |
| Eastern & Central Africa | 12-15 (1) | 09-11 (1)<br>11-15 (2)<br>15-16 (3)<br>16-17 (2)<br>17-18 (1) | 13-15 (1)<br>15-17 (2)<br>17-19 (3)<br>19-21 (2)<br>21-22 (1) | 21-00 (1) |
| Southern Africa | 10-11 (1)<br>11-13 (2)<br>13-14 (1) | 07-09 (1)<br>09-12 (2)<br>12-13 (3)<br>13-14 (4)<br>14-15 (3)<br>15-16 (2)<br>16-17 (1) | 06-08 (2)<br>08-14 (1)<br>14-16 (2)<br>16-19 (3)<br>19-21 (2)<br>21-23 (1)<br>23-01 (2)<br>01-02 (1) | 20-21 (1)<br>21-23 (2)<br>23-01 (1)<br>21-23 (1)* |
| Central & South Asia | 09-11 (1)<br>18-20 (1) | 09-11 (1)<br>18-19 (1)<br>19-21 (2)<br>21-22 (1) | 07-08 (1)<br>08-10 (2)<br>10-12 (1)<br>17-19 (1)<br>19-21 (2)<br>21-23 (1) | 06-08 (1)<br>19-21 (1) |
| Southeast Asia | 10-12 (1)<br>18-20 (1) | 09-11 (1)<br>14-17 (1)<br>17-19 (2)<br>19-21 (1) | 06-08 (1)<br>08-10 (2)<br>10-13 (1)<br>16-21 (1)<br>21-00 (2)<br>00-02 (1) | 05-09 (1) |
| Far East | 17-18 (1)<br>18-19 (2)<br>19-20 (1) | 10-16 (1)<br>16-18 (2)<br>18-20 (3)<br>20-21 (2)<br>21-22 (1) | 07-08 (1)<br>08-10 (3)<br>10-12 (2)<br>17-21 (1)<br>21-00 (2)<br>00-02 (1) | 03-05 (1)<br>05-08 (2)<br>08-09 (1)<br>06-08 (1)* |
| South Pacific & New Zealand | 13-15 (1)<br>15-17 (2)<br>17-19 (3)<br>19-20 (2)<br>20-21 (1) | 09-13 (1)<br>13-17 (2)<br>17-19 (4)<br>19-20 (3)<br>20-21 (2)<br>21-23 (1) | 07-08 (2)<br>08-11 (3)<br>11-13 (2)<br>13-18 (1)<br>18-20 (2)<br>20-22 (3)<br>22-00 (4)<br>00-01 (3)<br>00-03 (2)<br>03-07 (1) | 00-01 (1)<br>01-06 (3)<br>06-08 (4)<br>08-09 (2)<br>09-10 (1)<br>02-04 (1)*<br>04-07 (2)*<br>07-08 (1)* |
| Australasia | 14-16 (1)<br>16-18 (2)<br>18-19 (3)<br>19-20 (2)<br>20-21 (1) | 09-11 (1)<br>13-17 (1)<br>17-19 (2)<br>19-20 (3)<br>20-21 (2)<br>21-22 (1) | 16-18 (2)<br>18-21 (1)<br>21-23 (2)<br>23-03 (3)<br>03-04 (2)<br>04-07 (1)<br>07-09 (2)<br>09-11 (3)<br>11-13 (2)<br>13-16 (1) | 02-03 (1)<br>03-05 (2)<br>05-07 (3)<br>07-08 (2)<br>08-09 (1)<br>05-06 (1)*<br>06-07 (2)*<br>07-08 (1)* |
| Caribbean, Central America & Northern Countries of South America | 09-10 (1)<br>10-11 (2)<br>11-13 (3)<br>13-16 (4)<br>16-18 (2)<br>18-19 (1) | 07-08 (1)<br>08-10 (2)<br>10-13 (3)<br>13-17 (4)<br>17-18 (3)<br>18-20 (2)<br>20-21 (1) | 07-10 (4)<br>10-12 (3)<br>12-15 (2)<br>15-17 (3)<br>17-22 (4)<br>22-01 (3)<br>01-03 (2)<br>03-05 (1)<br>05-07 (2) | 19-20 (1)<br>20-21 (2)<br>21-01 (3)<br>01-05 (4)<br>05-06 (3)<br>06-07 (2)<br>07-08 (1)<br>20-23 (1)*<br>23-05 (2)*<br>05-06 (1) |
| Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay | 09-10 (1)<br>10-13 (2)<br>13-15 (3)<br>15-17 (4)<br>17-18 (2)<br>18-19 (1) | 07-08 (1)<br>08-11 (3)<br>11-15 (2)<br>15-16 (3)<br>16-19 (4)<br>19-20 (3)<br>20-21 (2)<br>21-22 (1) | 04-08 (1)<br>08-10 (2)<br>10-16 (1)<br>16-18 (2)<br>18-20 (3)<br>20-23 (4)<br>23-02 (3)<br>02-04 (2) | 21-00 (1)<br>00-04 (2)<br>04-06 (1)<br>01-05 (1)* |
| McMurdo Sound | 15-18 (1) | 11-16 (1)<br>16-18 (2)<br>18-19 (3)<br>19-20 (2)<br>20-21 (1) | 08-09 (1)<br>17-19 (1)<br>19-20 (2)<br>20-23 (3)<br>23-00 (2)<br>00-03 (2) | 00-03 (1)<br>03-05 (2)<br>05-07 (1)<br>04-06 (1)* |



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| *Reception Area* | *10 Meters* | *15 Meters* | *20 Meters* | *40/80 Meters* |
|---|---|---|---|---|
| Western Europe & North Africa | 09-11 (1) | 08-09 (1)<br>09-12 (2)<br>12-14 (1) | 06-07 (1)<br>07-10 (2)<br>10-13 (1)<br>13-14 (2)<br>14-16 (3)<br>16-17 (2)<br>17-19 (1) | 20-21 (1)<br>21-23 (2)<br>23-00 (1)<br>21-23 (1)* |
| Central & Northern Europe & European CIS | Nil | 08-09 (1)<br>09-11 (2)<br>11-13 (1) | 06-07 (1)<br>07-09 (2)<br>09-12 (1)<br>12-14 (2)<br>14-16 (2)<br>21-23 (1) | 20-00 (1)<br>20-22 (1)* |
| Eastern Mediter-ranean & Middle East | Nil | 08-09 (1)<br>09-11 (2)<br>11-12 (1)<br>20-22 (1) | 06-07 (1)<br>07-10 (2)<br>10-13 (1)<br>13-15 (2)<br>15-16 (1)<br>19-20 (1)<br>20-22 (2)<br>22-23 (1) | 20-23 (1) |
| Western & Central Africa | 11-12 (1)<br>12-14 (2)<br>14-15 (1) | 08-10 (1)<br>10-13 (2)<br>13-16 (3)<br>16-17 (2)<br>17-18 (1) | 06-07 (1)<br>07-09 (2)<br>09-14 (1)<br>14-15 (2)<br>15-16 (3)<br>16-18 (4)<br>18-20 (3)<br>20-22 (2)<br>22-00 (1) | 21-00 (1) |
| Eastern Africa | 11-14 (1) | 10-13 (1)<br>13-16 (2)<br>16-17 (1) | 07-09 (1)<br>12-15 (1)<br>15-19 (2)<br>19-21 (1) | 20-22 (1) |
| Southern Africa | 10-13 (1) | 07-09 (1)<br>09-11 (2)<br>11-13 (3)<br>13-15 (2)<br>15-16 (1) | 05-07 (1)<br>07-09 (2)<br>09-10 (1)<br>12-14 (1)<br>14-16 (2)<br>16-18 (3)<br>18-19 (2)<br>19-22 (1)<br>22-00 (2)<br>00-01 (1) | 19-22 (1) |
| Central & South Asia | 17-19 (1) | 08-11 (1)<br>16-17 (1)<br>17-19 (2)<br>19-21 (1) | 07-08 (1)<br>08-11 (2)<br>11-13 (1)<br>17-19 (1)<br>19-21 (2)<br>21-23 (1) | 06-08 (1)<br>19-21 (1) |
| Southeast Asia | 16-19 (1) | 10-11 (1)<br>11-13 (2)<br>13-16 (1)<br>16-18 (2)<br>18-21 (1) | 05-07 (1)<br>07-09 (3)<br>09-11 (2)<br>11-12 (1)<br>21-23 (1)<br>23-01 (2)<br>01-02 (1) | 01-03 (1)<br>03-06 (2)<br>06-08 (1)<br>03-06 (1)* |
| Far East | 16-17 (1)<br>17-18 (2)<br>18-19 (1) | 14-15 (1)<br>15-17 (2)<br>17-19 (3)<br>19-20 (2)<br>20-21 (1) | 07-08 (1)<br>08-09 (2)<br>09-10 (4)<br>10-13 (3)<br>13-15 (2)<br>15-20 (1)<br>20-22 (2)<br>22-00 (3)<br>00-01 (2)<br>01-03 (1) | 01-03 (1)<br>03-07 (2)<br>07-08 (3)<br>08-09 (1)<br>03-05 (1)*<br>05-07 (2)*<br>07-08 (1)* |
| South Pacific & New Zealand | 11-13 (1)<br>13-15 (2)<br>15-17 (3)<br>17-19 (2)<br>19-20 (1) | 09-11 (1)<br>11-13 (3)<br>13-17 (2)<br>17-19 (3)<br>19-21 (4)<br>21-22 (3)<br>22-23 (2)<br>23-01 (1) | 13-19 (1)<br>19-21 (2)<br>21-23 (3)<br>23-01 (4)<br>01-03 (3)<br>03-05 (2)<br>05-06 (1)<br>06-07 (2)<br>07-09 (3)<br>09-13 (2) | 21-22 (1)<br>22-23 (2)<br>23-00 (3)<br>00-05 (4)<br>05-07 (3)<br>07-08 (2)<br>08-09 (1)<br>23-02 (1)*<br>02-06 (2)*<br>06-07 (1)* |
| Austral-Asia | 14-15 (1)<br>15-17 (2)<br>17-19 (3)<br>19-20 (2)<br>20-21 (1) | 08-10 (1)<br>13-17 (1)<br>17-19 (2)<br>19-21 (3)<br>21-22 (2)<br>22-03 (1) | 19-21 (1)<br>21-23 (2)<br>23-01 (4)<br>01-03 (3)<br>03-04 (2)<br>04-07 (1)<br>07-08 (2)<br>08-10 (3)<br>10-12 (2)<br>12-13 (1) | 01-02 (1)<br>02-03 (2)<br>03-06 (3)<br>06-08 (2)<br>08-09 (1)<br>02-04 (1)*<br>04-06 (2)*<br>06-07 (1)* |
| Caribbean, Central, America & Northern Countries of South America | 09-10 (1)<br>10-11 (2)<br>11-13 (3)<br>13-15 (4)<br>15-16 (3)<br>16-17 (2)<br>17-18 (1) | 07-08 (1)<br>08-10 (3)<br>10-12 (2)<br>12-15 (3)<br>15-17 (4)<br>17-18 (3)<br>18-19 (2)<br>19-20 (1) | 06-08 (4)<br>08-10 (3)<br>10-15 (2)<br>15-17 (3)<br>17-23 (4)<br>23-01 (3)<br>01-03 (2)<br>03-05 (1)<br>05-06 (2) | 19-21 (1)<br>21-02 (3)<br>02-04 (2)<br>04-07 (1)*<br>22-03 (2)*<br>03-05 (1)* |
| Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay | 09-10 (1)<br>10-12 (2)<br>12-14 (3)<br>14-16 (4)<br>16-17 (3)<br>17-18 (2) | 07-08 (1)<br>08-09 (2)<br>09-13 (1)<br>13-15 (2)<br>15-16 (3)<br>16-19 (4)<br>19-20 (2)<br>20-21 (1) | 06-15 (1)<br>15-17 (2)<br>17-19 (3)<br>19-23 (4)<br>23-01 (3)<br>01-06 (2) | 21-23 (1)<br>23-02 (2)<br>02-04 (1)<br>00-03 (1)* |
| McMurdo Sound, Antarctica | 14-18 (1) | 11-15 (1)<br>15-17 (2)<br>17-19 (3)<br>19-20 (2)<br>20-21 (1) | 08-10 (1)<br>17-19 (1)<br>19-20 (2)<br>20-23 (3)<br>23-01 (2)<br>01-03 (1) | 01-03 (1)<br>03-05 (2)<br>05-07 (1)<br>03-06 (1)* |

**Indicates best times to listen for 80 meter openings. Openings on 160 meters are also likely to occur during those times when 80 meter openings are shown with a propagation index of (2) or higher.*
*For 12 meter openings interpolate between 10 and 15 meter openings.*
*For 17 meter openings interpolate between 15 and 20 meter openings.*
*For 30 meter openings interpolate between 40 and 20 meter openings.*

*Propagation charts prepared by George Jacobs, W3ASK.*

High Normal or better, and for paths into South America and the South Pacific.

## VHF Conditions

Continue to expect a large number of solar flares and coronal mass ejections (CMEs), possibly triggering aurora during September. The end of September and all of October are the start of the autumn aurora season. Geomagnetic storms that ignite auroras occur more often during the months around the equinoxes during early autumn and spring. This seasonal effect has been observed for more than 100 years. When the *Kp*-index is greater than 5, you can look for possible aurora. The higher the *Kp*-index, the more intense the aurora can become. Consult the Last-Minute Forecast to find those days that are forecast to be Disturbed or Below Normal. You may also visit my propagation page, <http://prop.hfradio.org/> to view current conditions, including aurora activity.

The month of September statistically has the lowest amount of sporadic-*E* propagation activity. Toward the end of September trans-equatorial (TE) propagation will begin to occur between southern North America and northern South America. Openings generally will occur in the late afternoon to early evening.

Troposcatter conditions are generally very good for many of the VHF bands up to 440 MHz during September with the appearance of different weather fronts. This will be the primary mode for working up to 300 miles. A very useful internet resource for viewing tropospheric conditions is available at William Hepburn's "VHF /UHF Tropospheric Ducting Forecast" site, <http://www.iprimus.ca/~hepburnw/tropo_nat.html>.

Consult the Last-Minute Forecast to find those days that are forecast to be Disturbed or Below Normal.

## CQ WW DX Contest 2003

Next month's column will be devoted to a comprehensive forecast focusing on both weekends of the 2003 CQ WW DX Contest, with an update in the November issue for the CW weekend. Tips and resources for efficient operation and for maximizing scores also will be included.

73, Tomas, NW7U/AAMØEWA

### Correction

Mike Stein wrote to me and asked about the smoothed sunspot numbers reported for Oct. and Nov. 2002. They did not seem to be correct. He also noted that I did not report a smoothed sunspot number for Sept. 2002.

Good call, Mike! The numbers I reported were those reported by the SEC Space Weather Operations, instead of the S.I.D.C. Brussels International Sunspot Numbers. Of course, I should have used the official numbers from the Royal Observatory of Belgium.

The correct smoothed sunspot numbers for Oct. and Nov. 2002 are 91 and 85, respectively, and the missing smoothed sunspot number for Sept. is 95.

It's good to know there are alert readers! I appreciate your feedback. —*NW7US*


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*D44TD: ops Luca, IK2NCJ, and Stefano, IK2JUB (not pictured Luca, IK2PFL, and Spiros, SV8CS).*

put. Just submit the file for SSB to <ssb@cqww.com> and for CW to <cw@cqww.com>. If you did everything okay, you will get back an acknowledgement. If there is something wrong, you will get a message telling you what to do to correct the error. The messages are in numerous languages. If you don't see your language and you would be willing to help out by translating for your fellow countrymen, contact <questions@cqww.com> for more information.

A perennial problem with log checking is sorting out the club scores. For the 2003 contest we plan on having a club name template available as an overlay on your submission. This will prevent various club aliases such as P.V.R.C., PVRC, P.V.RC, etc. etc. Previously, each of the abbreviations would be seen by the computer as a separate club. The template will make the club scores more accurate and easier to compile. Remember that if you are a multi entry, each member of the team can claim a percentage of the score based on the total number of operators.

On CW, we again checked all the entrants for unclaimed packet use, and again we can report that very few entrants made the mistake of not claiming the correct category. The CQ WW has few requirements: write down the callsign of the station to whom you are talking and claim the correct category. It's not so hard. We can also report that the copying skills of the contest community are getting better and better. The UBN reports that have been made available to all entrants who submitted an electronic log have been found to be a useful learning tool. Everyone enters the contest to have fun, meet friends, and perhaps work some new ones. We can say with great certainty that the winners on all levels are really the winners.

## Thanks

Thanks to the members of the CQ WW Contest Committee who validated the winners and provided insight into many contesting topics. The 2002 crew included: K1DG, K3WW, N6AA, K3ZO, KR2Q (Dana Lynn Zwiebel, KR2Q harmonic), N2AA, N2NC, N3ED, N6ZZ, N9RV, W3ZZ, K1AR, KM3T, KT3Y, N5TJ, N5NJ, and N8BJQ. Our DX advisors were very helpful in offering advice, providing information, and sorting out potential problems. They also provided translations of the rules and robot responses in their respective languages: CT1BOH, DL6RAI, DJ6QT, EA3DU, E21EIC, OH2MM, F6BEE, G3SXW, I2UIY, JE1CKA, OH2KI, OK2FD, PY5EG, S50A, UA9BA, and VE3EJ. Many committee members typed in paper logs so the electronic data base would be as complete as possible.

## CLUB SCORES

### USA

| | |
|---|---|
| YANKEE CLIPPER CONTEST CLUB | 486,010,298 |
| FRANKFORD RADIO CLUB | 421,657,738 |
| POTOMAC VALLEY RADIO CLUB | 224,134,259 |
| FLORIDA CONTEST CLUB (W4) | 89,708,199 |
| NORTHERN CALIFORNIA CONTEST CLUB | 77,419,920 |
| SOUTHERN CALIFORNIA CONTEST CLUB | 76,860,066 |
| SOCIETY MIDWEST CONTESTERS | 61,987,675 |
| ARDXG | 56,572,710 |
| TENNESSEE CONTEST GROUP | 48,608,019 |
| NORTH COAST CONTESTERS (W3/W8) | 40,431,975 |
| NORTH TEXAS CONTEST CLUB | 40,256,658 |
| MINNESOTA WIRELESS ASSN (WØ) | 35,347,484 |
| SOUTHEAST CONTEST CLUB (W4) | 34,030,363 |
| HUDSON VALLEY DXCC (W2) | 33,221,086 |
| WESTERN WASHINGTON DXC | 30,089,312 |
| SOUTHWEST OHIO DX ASSN | 27,756,715 |
| MAD RIVER RC (W8) | 26,975,345 |
| CENTRAL TEXAS DX & CONTEST | 22,610,016 |
| WILLAMETTE VALLEY DXC | 20,518,928 |
| CAROLINA DX ASSN | 17,364,657 |
| ROCHESTER DX ASSN (W2) | 13,609,317 |
| GRAND MESA CONTESTERS (WØ) | 11,661,291 |
| ALABAMA CONTEST GROUP | 8,317,989 |
| TEXAS DX SOCIETY | 7,226,831 |
| OKLAHOMA DX ASSN | 6,171,013 |
| KENTUCKY CONTEST GROUP (W4) | 5,817,906 |
| SAN DIEGO DX CLUB | 5,670,302 |
| FLORIDA DXPEDITION GROUP | 5,446,540 |
| CENTRAL FLORIDA DX ASSN | 5,140,335 |
| MAGNOLIA DX ASSN (W5) | 4,992,312 |
| EASTERN IOWA DX ASSN | 4,608,408 |
| KANSAS CITY DXC | 4,195,200 |
| NORTH FLORIDA DX ASSN | 3,208,169 |
| SPKARC (W4) | 3,090,744 |
| SPOKANE DX ASSN (W7) | 3,009,874 |
| AMERICAN RED CROSS EMER (W2) | 2,754,891 |
| SOUTHERN CALIFORNIA DXC | 2,090,496 |
| ORDER BOILED OWLS NY (W2) | 1,588,593 |
| FLORIDA CONTEST GROUP (W4) | 1,257,719 |
| NORTH ALABAMA DX CLUB | 1,121,405 |
| ACARA (W8) | 956,424 |
| SALT CITY DX ASSN (W2) | 853,913 |
| METRO DXC (W9) | 851,548 |
| NORTHERN ROCKIES DX ASSN (W7) | 745,585 |
| NORTHERN ARIZONIA DX ASSN | 741,873 |
| LOUDOUN ARG (W4) | 649,150 |
| WPKROR (W8) | 592,592 |
| CENTRAL ARIZONA DX ASSN | 540,253 |
| GREAT SOUTH BAY RC (W2) | 503,425 |
| BAY AREA WIRELESS ASSN (W9) | 429,604 |
| CHERRYLAND ARC (W8) | 402,429 |
| GREEN RIVER VALLEY ARS (W9) | 237,151 |
| BERGEN ARA (W2) | 208,688 |
| NORTHROP GRUMMAN RADIO (W6) | 165,196 |
| NORTHERN CALIFORNIA DXC | 130,410 |
| SOUTHEAST DX CLUB | 28,387 |

### DX

| | |
|---|---|
| BAVARIAN CONTEST CLUB | 207,482,977 |
| RHEIN-RUHR DXA (DL) | 201,807,386 |
| CONTEST CLUB FINLAND | 143,257,808 |
| RUSSIAN CONTEST CLUB (UA) | 96,378,866 |
| CONTEST CLUB ONTARIO | 83,718,891 |
| MARCONI CONTEST CLUB (I) | 75,465,369 |
| LES NOUVELLES DX (F) | 60,019,935 |
| ARAUCARIA DX GROUP (PY) | 59,954,699 |
| TIKIRRIKI CONTEST CLUB (I) | 57,548,448 |
| SLOVENIA CONTEST CLUB | 51,831,387 |
| APHRODITE CONTEST GROUP (5B4) | 47,878,322 |
| CROATIAN CONTEST CLUB (9A) | 47,082,120 |
| URAL CONTEST GROUP (UA9) | 46,755,094 |
| KAUNAS TECHNICAL UNIV RC | 46,532,560 |
| YUCC (YU) | 46,466,303 |
| SPDXC (SP) | 37,427,003 |
| LATVIAN CC (YL) | 36,881,080 |
| UKRAINIAN CC (UR) | 35,206,041 |
| CHILTERN DX CLUB (CDXC) | 30,188,016 |
| TOP OF EUROPE CONTESTERS | 30,067,352 |
| UA2 CONTEST CLUB | 29,272,164 |
| LOW LAND CRAZY CONTESTERS (PA) | 27,370,252 |
| NORTH OF SCOTLAND CONTEST GRP (GM) | 27,317,208 |
| TUPY DX GROUP (PY) | 26,626,410 |
| LU CONTEST GROUP (LU) | 25,323,719 |
| HUNGARIAN DXC (HA) | 24,887,879 |
| JSFC (JA) | 21,334,867 |
| ATECI CONTEST CLUB (D4) | 20,723,768 |
| CONTEST CLUB SLOVENIA | 16,968,583 |
| BASHKIRIAN DX CLUB (RA9W) | 16,760,124 |
| BRITISH COLUMBIA DXC | 16,422,620 |
| SPB CONTEST GROUP | 15,553,603 |
| LZ CONTEST GROUP | 15,443,665 |
| BRESCIA DX GROUP (I) | 15,225,883 |
| GPDX PORTUGUESE DX GROUP | 15,035,571 |
| GM DX GROUP | 9,820,894 |
| SAREJAVO CG (T9) | 9,797,067 |
| BEEMSTER CC (PA) | 9,251,485 |
| THREE A'S CONTEST GROUP (GW) | 9,070,728 |
| Z30M | 8,968,683 |
| CENTRAL SIBERIA IDXC (UAØ) | 8,662,163 |
| DANISH DXG (OZ) | 8,645,054 |
| GRUPO ARGENTINA CW | 8,510,037 |
| SKY CONTEST CLUB (YU) | 8,350,874 |
| SARATOV RADIO CLUB (UA4) | 8,079,984 |
| VRHNIKA CONTESTERS (S5) | 7,954,350 |
| KIEV CG (UR) | 7,892,528 |
| SOUTHERN CROSS DX GROUP | 7,858,421 |
| RK3AWE CONTEST CLUB | 7,772,862 |
| DOZEN DASHES CONTEST CLUB (OM) | 7,236,680 |
| ROMAGNA CONTEST TEAM (I) | 7,171,579 |
| OM8A | 6,884,813 |
| CRIMEA CONTEST CLUB | 6,746,931 |
| GDXG (PY7/8) | 6,697,475 |
| AOMORI CONTEST CLUB (JA) | 6,583,903 |
| CONTEST CAMBRIA (GW) | 5,868,047 |
| TEMIRTAU CONTEST CLUB (UN) | 5,727,770 |
| ARUK (EX) | 5,657,451 |
| CZECH CC | 5,652,526 |
| G6PZ CONTEST GROUP | 5,645,778 |
| LYNX DX GROUP (EA) | 5,156,591 |
| R1ANF | 4,891,042 |
| BELORUS CONTEST CLUB (EU) | 4,712,165 |
| JDXG (BY) | 5,663,469 |
| LITHUANIAN DX GROUP | 4,550,454 |
| UFT (F) | 4,434,537 |
| BRUSSELS DX TEAM | 4,419,718 |
| PRETORIA CC (ZS) | 4,363,445 |
| LA CONTEST CLUB (LA) | 4,314,552 |
| MOSCOW CONTEST CLUB (UA3) | 4,109,780 |
| NORTH PATAGONIA DX GROUP | 4,047,059 |
| OBNINSK QRU CLUB (UA3) | 3,828,958 |
| THAILAND DX ASSOCIATION | 3,777,851 |
| ERAU (ES) | 3,567,064 |
| JAPAN CRAZY CONTEST CLUB (JA) | 3,387,258 |
| ARM (ER) | 3,374,077 |
| OK2RAB | 3,355,584 |
| MICHURINSK CONTEST GROUP | 3,337,470 |
| BELOKRANJEC CC (S5) | 3,156,985 |
| SPCC (SP) | 2,816,584 |
| KIEL CANAL ACTIVITY GROUP | 2,730,648 |
| VLADIMIR RADIOCLUB (UA3V) | 2,672,145 |
| NOVOSIBIRSK CONTEST CLUB (UA9) | 2,656,637 |
| ZS6DDX | 2,595,117 |
| VRC (ES) | 2,408,592 |
| UKRANIAN DXC (UR) | 2,375,863 |
| YO DX CLUB | 2,356,521 |
| IVANOVO'S DX CLUB (UA3U) | 2,325,524 |
| SK4BX | 2,289,834 |
| KRANSNODAR KONTEST KLUB (UA6) | 2,055,747 |
| KRYDXC (UA1O) | 2,008,032 |
| VOJODINA CC (YU7) | 1,886,033 |
| TEKCHNOSPORT (UA9) | 1,877,318 |
| CROATIAN DX CLUB | 1,855,648 |
| NORTHERN FUKUSHINA CC (JA) | 1,788,186 |
| LA DX GROUP (LA) | 1,775,523 |
| AMSTERDAM DX CONT | 1,632,618 |
| S53DZZ | 1,625,703 |
| BANAT DX GROUP (YU7) | 1,605,646 |
| ARI - MONZA (I) | 1,566,300 |
| KRS (UR) | 1,524,599 |
| THE NORTHERN LIGHTS (G) | 1,459,724 |
| PUSHKINO RC (UA3) | 1,398,403 |
| ICELAND RA (TF) | 1,355,724 |
| TA1KB - TRAC ISTANBUL | 1,319,993 |
| RADIO CLUB DE PANAMA | 1,275,881 |
| CENTRAL SIBERIA DX CLUB (UA9) | 1,233,446 |
| ARUBA RC | 1,233,114 |
| NOVIOMAGUM DX CLUB (PA) | 1,189,535 |
| SERPUKHOV (UA) | 1,177,072 |
| CHELYABINSK CLUB (UA9) | 1,153,289 |
| RADIOKLUB PREROV (OK2) | 1,113,956 |
| KEY CONTEST TEAM (I2) | 1,053,328 |
| FERRARA DX TEAM (I4) | 1,018,559 |
| NORTHERN CORRIDOR RADIO (VK6) | 945,618 |
| ALBERTA CLIPPERS (VE6) | 929,829 |
| OL7D | 914,861 |
| FOX CC (YU) | 900,309 |
| MEDITERRANEO DX CLUB (I8) | 879,768 |
| WINNIPEG DX CLUB (VE4) | 871,059 |
| MOONSHINE HILL CONTEST (OK) | 852,217 |
| SK6AW HISINGENS RC | 805,975 |
| OL3A | 720,559 |
| ARKTIKA (UAØ) | 704,584 |
| YV DXPERT'S TEAM | 690,100 |
| WESTERN WIRELESS CC | 667,390 |
| GLOBUS CC (UR) | 663,139 |
| KCM (JA) | 649,210 |
| WPKROP | 592,592 |
| ROMANIAN AMATEUR RADIO | 579,492 |
| BSB DX GROUP | 545,901 |
| TARL(EY) | 527,280 |
| BANGOR & DISTRICT ARS (GI) | 485,067 |
| OK2KFK | 483,189 |
| FARC (UAØ) | 475,988 |
| TA2KK - TRAC KADIKOY | 449,276 |
| DREAM TEAM (YU) | 399,039 |
| VT ARC | 393,625 |
| SHAKHTINSKY (UA6) | 379,655 |
| M29 (UR) | 341,187 |
| TALLINN RADIO CLUB | 292,350 |
| SHIZUOKA DX RADIO ASSN | 291,600 |
| OM3KUN | 290,461 |
| WYTHALL RADIO CLUB (G) | 261,734 |
| YO3KAA | 241,378 |
| MANIN (OK) | 218,140 |
| BLOEMFONTEIN RADIO AMATEUR (ZS) | 217,578 |
| 9A1CRJ | 199,385 |
| TAGCC (UA9) | 149,522 |
| OMSK OBLAST RC | 149,080 |
| PARNU RC (ES) | 141,930 |
| BULGARIAN ISLAND RC | 121,482 |
| MACEDONIA CONTEST TEAM | 118,575 |
| SOUTH GERMAN DX GROUP | 114,606 |
| PRIKARPATTYA (UR) | 87,320 |
| AMATEUR RADIO CLUB OF SAIPAN | 85,519 |
| VORONEZH (UA3) | 77,964 |
| KAZAN RADIOCLUB | 70,283 |
| YO4KAK | 59,861 |
| TA3KC | 59,612 |
| KARLSKRONA RADIO KLUBB (SM7) | 17,472 |

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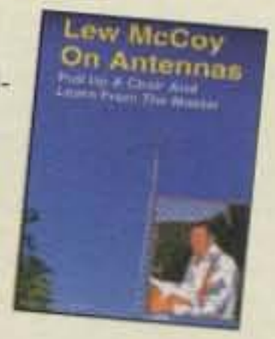

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A special thanks to Dick, N6AA, who once again spent countless hours making the CQ WW database the best in contesting. The CQ WW uses the software developed by Tree, N6TR, to create the database. Larry, N6TW, was invaluable in many ways. His help and expertise provided a very big part of what you see in the magazine. Phil, N6ZZ, put in lots of hours making sure the database was as clean as possible. Thanks to John, K1AR, for his advice and hard work to help make the CQ WW so successful.

Congratulations to all the winners and entrants! With the sunspot minimum approaching, it is important that all contesters keep the flame burning by getting on the air. Join a local club. Get a fellow contester on for a local, friendly competition. To learn, build, participate, and have FUN is what contesting is all about! See you in the 2003 CQ WW. 73, Bob, K3EST

## DX QRM

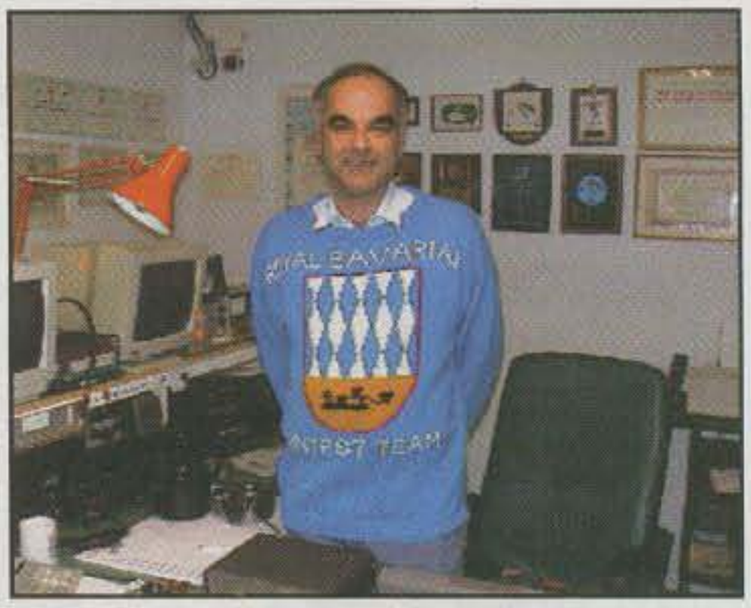
Terrible condx first day + high level of noise on low bands. It was a big fun anyway. . . . **4U1ITU (OM8AW).** Very bad, extremely windy weather before and during the contest. A tribander did not get up until Sunday morning. . . . **4U1VIC.** Who said QRP has to be weak? We had so much fun, we are looking forward to another QRP trip in 2003. . . . **6Y1A.** Major screwup. CQ msg was 6Y2A and TU message was 6Y5A. Treat other logs lightly if reported call is 6Y5A. Treat my log harshly. Contest was fun from DX location and QRP only. . . . **6Y2A.** Vy happy that I could QSO with HZ, PY's my new entities! This year's result is the best score of my past participations. Only 10W output! Mni tks 4 ur works. . . . **7K2PBB.** Worst condx in many years. Had a total blackout, nothing heard on any band on Saturday afternoon. Much better on Sunday. . . . **7S2E.** Thanks to 8P6SH for all of his help! . . . **8P2A.** Sorry but I was too busy to work more this time. Thanks a lot for all QSOs anyway. . . . **9A3CY.** Since A61AJ is a fully equipped multi-multi setup, I had to rewire the station in a way that only three operating positions were available (SO3R—hi!) though. Except for simple logging network, no connections were available between the stations. Had to jump a lot around the spacious shack when moving mults! . . . **A61AJ.** First SO2R attempt with some teething problems. Many thanks to Ivo (ADA) for his help, 5B4AFM for his SO2R box, and 5B4ES for hosting again. . . . **C4W.** We had great fun with our LP MM entry. . . . **C6AKP.** Great contest and a fun time at Ken's place. Got a nice call assigned as C6ARS. Conditions were better in Carib than some other places it seems. Was still hit by Saturday flare, but went stateside and had a 190 hour (best in contest). Had a blast as usual. Sometimes the conditions were too good. Had to QSY twice just to shake the pile-up which was getting so out of hand it was killing the rate. . . . **C6ARS.**

I decided on single band operation due to the lack of time for adjusting all three monobanders to the CW segments mainly, and because of having not much CW experience in contests as well. This was my first CQWW CW ever. . . . **CE4U.** Thanks to Santos, CT1DVV, and and Tony, CT1ESV, and family for superb hosting! . . . **CT8T.** Never trust just one alarm clock! . . . **CT9M.** After a long time of being QRT it was my first try in the CW part. My K2 with 5 watts into a multiband dipole did a great job. . . . **DF9JZ.** Did not to reach my goal, to make 1000 QSOs and/or to catch the German record in this class. Will try next year again! . . . **DL1CW.** A big thank you to the hams of the Guernsey Amateur Radio Society, especially to Ed, GU3SQX, and Phil, GUØSUP, for their help and hospitality. Guernsey is a place that is much too beautiful to go there only from Thursday to Monday with two days of radio in between. I'll be back, but next time for a real holiday—well, maybe with a little pile-up every now and then. . . . **DL2OBF.** What a contest! QRP is simply the best category to participate in. Many thanks to Roger, DL5RBW, who offered me to use his absolutely professional equipment. . . . **DL6RDR.** FB contest! . . . **ES1TM.** Good test. Many DX stations + IOTA islands. . . . **EU6TV.** Just a brief operation from France outside. These times I was also active as G3VQO (checklog attached). Hope it doesn't cause too much confusion. . . . **F/G3VQO.**

First entry QRP with my K1. Band-limited: 80/40/20/15m only. QRP is really fun! Not sure I will enter anymore a contest running more than 5W! . . . **F5PBL.** The neighbour rang at the door because too much TVI, fortunately during the last 15 minutes of the contest. I am going to fix his problem now. . . . **FM5GU.** A dose of the lurgy prevented anything other than a token entry. Good fun though, and perhaps no one else is foolish enough to enter 40m QRP and I'll get a bit of wallpaper. . . . **GØWAT.** This year I managed to beat the all-time UK record I made in 1992 for this category. . . . **G3KHZ.** Great fun as always. Virtually no signals on LF bands from W and VE at dawn on Saturday morning; rest of day dominated by very strong short-skip signals from within EU. My points per QSO rate suffered accordingly. . . . **G3NKS.** Very enjoyable. The long path openings to ZL/VK/JA were great. Can't wait for next year. Five watts max. output to an A3S 3-ele. . . . **G4ELZ.** Great fun as usual, but disappointing to be hit by aurora, again! . . . **GM7V.** Could only do one day, but had a good time! . . . **GU3SQX.** Highlight: being called by HI8 for a 7 MHz mult. at 2358Z on Sunday. Lowlight: failing to move the TF double mult. . . . **GW7X.** Slightly over the 15m Asian record. Hope my logs are good! . . . **H2G.** First time that HB9A, the callsign of the union of Swiss radio amateurs USKA, has been used in a CQWW contest M/S. All operators liked this contest very much and would like to do again next year. . . . **HB9A.** It was not too easy to work with DX stations. Maybe next year I can work at my home QTH again, and I try to work with QRP again during CQ to do SSB and CW QRP EU records. Tnx for CQWW! . . . . **HG5Z.**

Propagation was very poor on Saturday and only a little better on Sunday. Only the great help of two friends like DL6RAI and DL2NBU helped us to reach a good score. We worked Zone 3 on 10 only on Sunday afternoon; that give an idea of the bad propagation. . . . **IQ4A.** Not so great condx and having a cold, I had a nice sleep! Shortest sleep (40 minutes) on SSB and a longest sleep (10 hours) on CW, so 2002 WW was over and now thinking abt 2003. Life's too short. Sleep and excuse should have been short or zero! . . . **JA8RWU.** Never try a new logging program one day before the contest! . . . **KP3Z.** Very strong aurora first day! Great fun in spite of very poor condx on high bands on Saturday. . . . **LY6M.** Wow! Twenty meters opened up to the U.S. on the Sunday evening. Until then I had not worked many U.S. stations. It made a big difference to the final score. Fantastic contest. . . . **M4T.** My first ever go at a CW contest and what a way to dive in—at the deep end. Enjoyed giving a few points away. 100% S&P. Next year perhaps a proper effort. . . . **MW5EPA.** Great experience from Zone 10! . . . **OA4O.** Amazing what 100W to a second-hand trap-GP indoors downtown can work with the help of sunspots. Great ops at PTØF and XT2DX, who heard me sneaking by the pile-up, QRQing instead of going QRS! Also made some contacts QRO and with real antennas. . . . **OE5OHO.** Aurora destroy my dream about good contest! . . . **OG8L.** Poor condx again on Saturday! The recent storm (falling trees) in this area a couple of weeks ago caused damage on my 15m and 160m antennas, so single band LP operation was chosen. Better so, because in any case my fairly modest antennas would not have been sufficient enough to compensate the difficult conditions, as even the "big guns" had problems! . . . **OH2NN.**

Beautiful contest. I was active with my new FT-817 and new antenna. Really beautiful. . . . **OK1IF.** This year I had to cancel IH9P operation because of QRL so I tried 15m with tribander. I was surprised how it worked well! . . . . **OL5Y.** The XYL went into the hospital a few days before the contest and had an operation. Hence no visiting guest operators, just low pitch contesting. I wished I had not used the OQ prefix. I've seen me spotted as OZ1T, OY1T, and OK1T. People just don't expect the OQ prefix and are puzzled. Lots of time lost. In total I operated 31.5 hours, and missed all East and Pacific openings. . . . **OQ1T (ON4UN).** First time ever I made over 1000 QSOs during a single weekend, no CQing only S&P. Happy to give out the special OQ4 prefix. Commemorative QSLs will be sent via the bureau to all those worked. Pse don't forget to send your QSL. . . . **OQ4CAS.** A perfect year for low power. Disturbed conditions were music to my ears. . . . **P40W.** Well, this was not exactly what I was planning! Study books were open on the desk but not much in use. Just too much fun! Did not want to miss out, so only some slight attempt at studying. Thanks for organizing! . . . **PA3BFH.** Very hard to go on with no more than 70 watts all the time and using second radio, because FT1000MP gone to repair! Anyway, very happy to have HC8N on all six bands! . . . **PY2NY.** I thank for they have organized this beautiful contest of high level. . . . **PY3CQ.** Thanks for good contacts to all amateurs of our hobby! . . . **RV3LO.** Every year I like worked in the nice CQWW contest. . . . **RV3YR.** Ham radio is fun, isn't it? . . . **S51JM.** Nice to experience condx reversal from CQWW SSB! . . . **S56A.** First time I work more QSOs second day. . . . **S58A.** First contest with keyboard keying—*wonderful!* . . . **SM3EAE.** My thanks to Juan, TG9AJR, and Jocelyn, my wonderful hosts! This was a last minute, no preparation DXpedition. All I brought to TG was a paddle and keying interface. Juan supplied the antenna (vertical), xcvr (Yaesu 767GX), and computer. Thanks to XE1KK and N5KO for installing the antenna in September. . . . **TG9AJR. S**ome new operators in the team tasted the thrill of big M/S station. Sure they will try again! . . . **TM2Y.** Very very like the WW contest. . . . **UAØBA.** TNX FB contest. . . . **UAØFAI.** Sorry I was very busy on the first day. Condx were quite good on the second day. . . . **UA9AB.** Very good contest with the balcony antenna. . . .**UA9QCP.** The excitement before and during the contest, the drive that keeps one alert 48 hrs straight, the highlights like continuous high rates or openings to high density mult areas that were not missed, then the end of it all and instant feeling of deep satisfaction and then joy. I'll be there next time for sure! . . . **UN1LT.** I'm very appreciated to Sergey, MØSDX, for warm hospitality. . . . **UT3UA.**

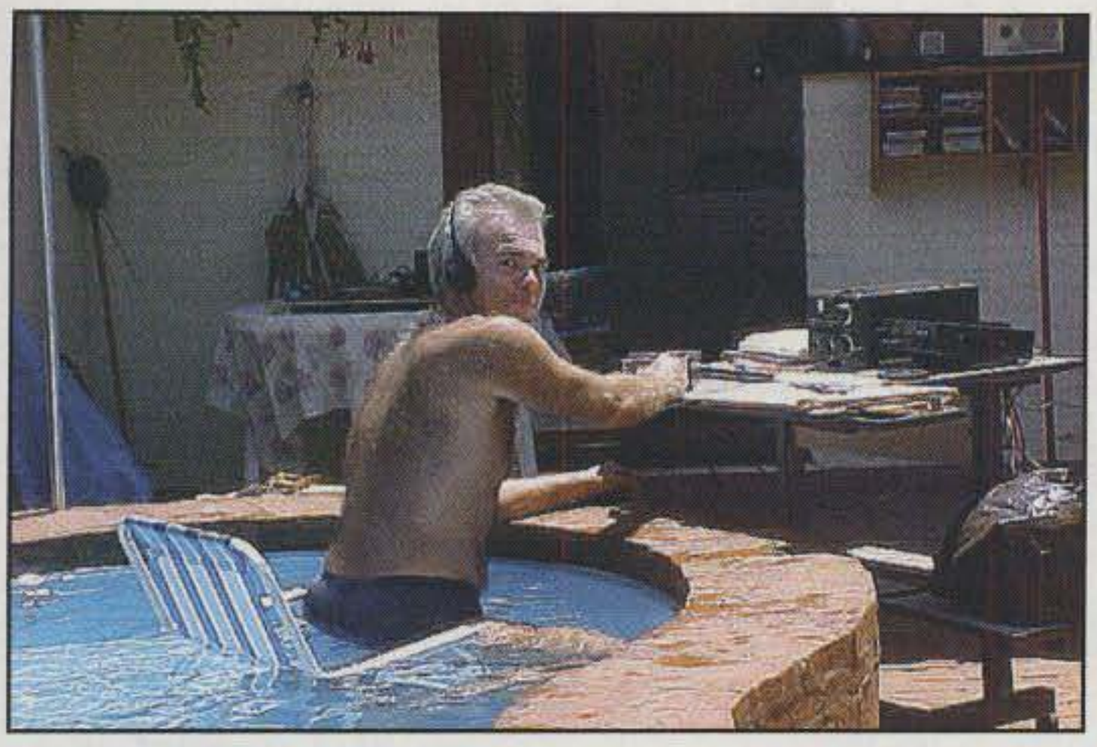



*Roland, DK3GI, a member of the Royal Bavarian Contest Team, stands for the national song.*

First and half second night have a big pile-up! But RX antenna to JA's is broken and PA is flame. Have a very bad weekend. Only 700 QSOs in 13 hours. See you next year. I'll be back and have the best result in SO 80m HP. . . . **UY2UF.** First day of contesting was a disaster thanks to aurora, but the conditions improved a lot on Sunday. Being the only station active from zone 2 resulted in huge pile-ups on Sunday. . . . **VA3NA.** Great way to clean out the cobwebs after 10 years away from CW contestng! Was even more of a blast with 10 watts and a dipole! I'm hooked again! . . . . .**VE3RSA.** Part-time operation, introduced another ham to the joys of CW contesting. Conditions sounded not so good on Saturday. . . . **VK5GN.** Jet lagged from long overseas trip to discover my friendly power company changed street distribution to 23 KV with an S9+20dB noise level. It was still fun. Perhaps they will change their insulators in time for next year's test. . . . .**XE1V.** I worked the contest at 29 wpm and was very surprised to find out some few speed demons (45+ wpm) doing endless CQing refusing to QRS. Probably they already had the multiplier, or in some other cases, the autorepeat on. Nevertheless a lot of fun! . . . **XE2AC.** Propagations were good all acrross the bands for the whole two days plus new radio made contest time a lot of fun! . . . **YBØUNC.** Propagation within Indonesia and South and North America is very good. This contest was hard work. . . . .**YE1A.** Our first try with computer real-time logging and operators have to learn how to send code with a keyboard. Have great fun. Even our low band antennas are marginal. HC8N copied us. Lots to learn. . . . **YE1ZTC.** Starting with the contest from small city near Yugoslavian (Kosovo) border. After two hours contest was over because of electricity problems and huge snow storm. I decided for "safe escape" to YU8 land. I hope for more luck next time. All the best for the Contest Committee. . . . .**ZA/S57AW.** Very pleased with score considering I don't have a beam. Horizontal loop performed really great. I became an expert in retuning the ATU for a quick QSY. . . . **ZC4DW.** Many difficult stations were very well heard here by the south of Brazil. We thanked for the organization and we were in the wait of the accountancy of the points. As every scout says, "Be Prepared. . . .**ZX3S (PY3UEB).** With two radio failures, thunderstorm, and power outage, I think this was a fine score after all. . . . **ZY5A.**

## USA QRM

Something was definitely wrong with the 80m antenna! . . .**AA1K.** Lost about one hour Friday night due to local lightning storm. Very rough day Saturday, with high bands all but dead until sunset. Sunday was pretty good but rates were not as good as we had hoped. First CW multi-single from AA5NT. . . . **AA5NT.** As a college student coming home for the Thanksgiving break, I practically just took a contest expedition to my parents' house. Thanks to N8ET, N8ZYL, KB8YUO, and KB8RQS for their help with design and installation of antennas. . . . **AA8UP.** Finished up QRP DXCC. Not as easy as QRO, but lots of fun. . . . **KØCA.** For my first single-band effort, I tried 80m. Highly recommended. You really learn the band when it's all you do for the whole contest! This score represents only the first night. Unfortunately, a family event took top priority for the second night. . . . **K1IR.** Conditions were so bad, I let my wife talk me into quitting the contest and working on projects around the house. I woke up Sunday morning early, turned on the radio, and started running. Wow, conditions were back when I got the tap on the shoulder, "I thought you were gonna work on the house today!" Coldly I switched off the radio. Next time I will keep my mouth shut. Contest weekend is contest weekend, no matter how bad condx seem. . . . **K2NJ.** Indoor antennas in apartment makes it interesting! . . . **K2UR.** First CQWW in 19 years! . . . **K3TC.** Many DX ops have great ears! . . . **K4RV.** 10, 15m dead to Europe Saturday morning! Bad for the left



*Carlos, PY2FRW, operating QRP from his "near the water" shack.*

coast! Conditions generally poor for most of the test for us "little pistols." Oh, for a beam—and power! . . . **K6CEO.** Lousy, noisy conditions, 25-year-old gear that was temperme-ntal, antenna work that never worked, blew the band switch up on 15m in the amp, a rain storm, poor sleep, and only had time to make about 113 contacts on four bands. Damn, what fun! I can't wait til next year! . . . **K7DD.** Was lots of fun, but it just ain't the Caribbean! Also, you know Saturday was bad when you start working new "mults" and they turn out to be common countries such as France, Italy, Germany, etc.! . . . **K7ZUM.**

Into every contester's life a few protons must fall. . . . **K9MA.** I wait all year long for the CQWW. QRP contesting doesn't get any better than this! . . . **KA6SGT.** The solar flare Saturday made me check to see if antenna still standing. . . . **KC7UP.** Station KL7Y possible new zone 1 SB 20 record (if I make the log checking cut!). Conditions poor for most of the contest, but great time with friends and beautiful aurora. Thank you to Dan, KL7Y, Chris, KL9A, and Frank, KL7FH! . . . **KL9A (K7NT).** Wow! Non-contester types just don't know the study in propagation they are missing out on! This was unbelievable. The arctic flutter on 20 was so bad I could almost see ice on the signals! Yet still worked many EUs. Glad 10 recovered from the proton event on Sunday! . . . **KS7T.** Like two different contests! Boy how conditions changed on day 2. Glad I didn't give up. . . . **N1DG.** A personal best for me while operating Single-Op Assisted! Conditions on Sunday excellent! 80 meters proved to be a problem for me on the sloper. Probably need to check it. . . . **N1MD.** Solar flare shut us down Friday night/Saturday morning here above 43 deg lat. Had a lot of fun on Sunday however. . . . **N2WK.** Goals 1K Q's and 1M points. Did both, with margin: 1.8× last year's score. Re last year: 80 and 40 about the same; on high bands, three more mults but ran more and got twice as many QSOs despite solar flare. Flare killed 10 and injured 15 Saturday, but both bursting with EU's Sunday . . . **N3UM.** Solar activity sure made for some strange propagation. Worked 9V1YC from the east, which is 90 degrees from either long or short path. . . . **N4IG.** Saturday conditions made me ponder retirement from the sport. Sunday was the most fun I've ever had in a DX contest. It was neat to have more than enough people to work on Sunday. It was a mad dash to the finish line. I'm finally getting used to using two radios at once. What's next, SO3R? . . . **N4YDU.** This was my third time out in the QRP category and managed to beat last year's score despite challenging conditions the second day. This is my favorite contest of the year and my thanks to CQ for sponsoring it! Thanks also for all the QSOs! . . . **N5TW.** Working SU1ER long path on 40 was great! . . . **N6IC.** The sun god must hate radio contests! Thank God for JA's! . . . **N7DF.** Saturday was a struggle! Sunday was a lot of fun! . . . **N8ET.** Poor band conditions on Saturday. Had to leave early on Saturday due to ARES. Went to ARES weather/tornado spotting. Safety comes first! . . . **N8XP.** Bands lousy on Sunday morning so worked HC8N on 6m with 5 watts! . . . **N9IJ.**

Old Sol and local weather sure did in band conditions Fun in spite of poor conditions at outset. The little pistols were only going to S&P anyway. . . . **NE4S.** Thanks to all the great ops who copied my 5 watt signal and thanks to the gang at XT! . . . **NU4B.** QRP is more fun in this event than anyone who hasn't tried it will believe. Of course a three-high stack of TH-7's sure helps. . . . **WØETC.** I know why they call it the balck hole. . . . **WØSLW. P**atience is still a virtue!! Again? . . . **W1AMF.** Had a great time and improved my fist! . . . **W1DAD.** Great contest. Casual operation netted some new countries on 10 using a 30 meter delta loop. . . . **W2BEE.** The worst of times (Saturday) and the best of times (Sunday)! . . . **W4ZV.** Bad thunderstorms on Friday night. Murphy hit me late Friday night and I lost the amp. Conditions poor to fair and the Oklahoma Sooners lost on Saturday. Thank goodness that the Cowboys didn't play Sunday. I still enjoyed the contest. There were a lot of good operators. See you next year. . . . **W5FO.** Neither the propagation nor my score were as good as last year, but it was still a terrific contest for QRP. I worked P3A, 4W6MM, and 5X1Z and got XT2DX on three bands! Wow! . . . **W6RCL.** The sun just didn't want this contest to happen. . . . **W6YJ.** Those VooDoo ops at XT2DX have amazing ears. . . . **W7BX.** Solar flare ruined any chance of a competitve SOAB score. Too bad cuz this mite be the last year of 10m prop for this cycle at least from the NW. . . . **W7GG.** More fun on CW. I wonder what scores would be like without computers. . . . **W7LKG.** It's always nice to greet old friends from around the world. . . . **W8GOC.** The extensive record list that Bob, K3EST, has developed for this contest at the cqww.com website makes it the best contest in the world. Pick the record, and try to beat it! . . . **W8QZA.** Two contests rolled into one 48 hour period. Whether you like prosperity or adversity, this contest had it! . . . **W9RE.** My first contest using electronic logging. Sure helps the score and relieves the chore of dupe checking. As always, lots of fun. . . . **WA4DOU.** Limited time to operate, but amazed at what can be done with 5 watts and an indoor antenna. . . . **WB9MII.** My first CQWW CW. Enjoyed all the fun and frustration! . . . **WD9DZV.**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# SINGLE OPERATOR

## NORTH AMERICA

### UNITED STATES

| | | | | | |
|---|---|---|---|---|---|
| **KT1V** | **A** | **8,027,304** | **4110** | **158** | **550** |
| | | | | (Op: NT1N) | |
| **K5ZD/1** | **"** | **7,069,788** | **3496** | **162** | **564** |
| **KQ2M/1** | **"** | **6,716,460** | **3517** | **155** | **558** |
| **W1KM** | **"** | **6,116,422** | **3454** | **146** | **495** |
| **W1WEF** | **"** | **5,268,776** | **2979** | **142** | **504** |
| **K1AR** | **"** | **5,003,439** | **2612** | **153** | **554** |
| WC1M | " | 3,981,876 | 2440 | 141 | 455 |
| KC1F | " | 3,072,880 | 1946 | 123 | 445 |
| K5MA/1 | " | 2,542,032 | 1801 | 122 | 386 |
| W1FJ | " | 2,274,810 | 1540 | 131 | 442 |
| W1ECT | " | 1,566,402 | 1421 | 97 | 329 |
| W1CSM | " | 1,211,602 | 894 | 117 | 401 |
| K1KD | " | 533,049 | 599 | 73 | 246 |
| W1GF | " | 509,040 | 518 | 90 | 270 |
| W1BIH | " | 456,615 | 530 | 95 | 270 |
| KG1E | " | 414,725 | 657 | 76 | 237 |
| W1AX | " | 276,120 | 408 | 77 | 218 |
| K1LJ | " | 250,776 | 420 | 63 | 180 |
| AK1N | " | 224,136 | 337 | 81 | 202 |
| W1CU | " | 206,412 | 250 | 85 | 224 |
| W1ZK | " | 190,800 | 299 | 67 | 173 |
| W1LLU | " | 139,284 | 263 | 56 | 163 |
| KV1W | " | 114,654 | 221 | 51 | 143 |
| N1JW | " | 98,325 | 213 | 59 | 148 |
| N1SV | " | 79,740 | 232 | 53 | 127 |
| K1BD | " | 59,830 | 162 | 49 | 106 |
| W1EL | " | 36,025 | 113 | 48 | 83 |
| KA1VMG | " | 31,878 | 136 | 44 | 94 |
| W1ZT | " | 7,869 | 51 | 25 | 36 |
| **K1XX** | **28** | **366,749** | **1017** | **27** | **110** |
| **W1UK** | **21** | **599,610** | **1371** | **33** | **132** |
| **W1MK** | **3.5** | **284,050** | **852** | **25** | **105** |
| K2LP/1 | " | 6,394 | 59 | 10 | 36 |
| **AA6TT/1** | **1.8** | **12,390** | **127** | **15** | **44** |
| ***N1UR** | **A** | **1,718,009** | **1369** | **108** | **383** |
| ***W1WAI** | **"** | **1,711,071** | **1260** | **103** | **396** |
| ***KS1J** | **"** | **1,389,694** | **1139** | **99** | **355** |
| *K1HT | " | 1,354,003 | 1033 | 110 | 359 |
| *W1TE | " | 1,102,475 | 864 | 110 | 365 |
| *W1EQ | " | 1,078,585 | 946 | 91 | 324 |
| *WA1Z | " | 950,460 | 811 | 102 | 332 |
| *K1IB | " | 659,945 | 726 | 82 | 273 |
| *WG1Z | " | 646,129 | 620 | 90 | 299 |
| *N1DC | " | 644,271 | 669 | 88 | 293 |
| *N3KCJ/1 | " | 476,442 | 567 | 81 | 265 |
| *K1EP | " | 476,256 | 549 | 81 | 271 |
| *W1KT | " | 464,121 | 483 | 89 | 282 |
| *W3TB/1 | " | 336,980 | 446 | 75 | 215 |
| *W1CCE | " | 276,458 | 326 | 90 | 253 |
| *K1KU | " | 270,580 | 346 | 83 | 249 |
| *K1VSJ | " | 224,145 | 333 | 70 | 185 |
| *N1DS | " | 218,350 | 343 | 74 | 201 |
| *NG1J | " | 179,643 | 297 | 67 | 190 |
| *W2SUQ/1 | " | 155,277 | 268 | 62 | 181 |
| *AE1T | " | 152,031 | 283 | 50 | 137 |
| *K1SWG | " | 115,232 | 223 | 60 | 148 |
| *N1LW | " | 105,774 | 217 | 64 | 119 |
| *K1BV | " | 98,289 | 205 | 62 | 139 |
| *KK1W | " | 80,460 | 221 | 58 | 122 |
| *W1AMF | " | 74,085 | 172 | 46 | 119 |
| *KY1B | " | 71,896 | 206 | 59 | 150 |
| *KV1J | " | 43,605 | 129 | 46 | 89 |
| *KX1E | " | 32,686 | 123 | 32 | 86 |
| *W1CTN | " | 24,625 | 117 | 48 | 77 |
| *K1SM | " | 24,057 | 101 | 29 | 70 |
| *K1DS | " | 18,172 | 98 | 41 | 77 |
| *W6FC/1 | " | 12,540 | 66 | 22 | 54 |
| *W1DAD | " | 1,200 | 24 | 21 | 19 |
| ***KG1V** | **28** | **42,583** | **177** | **22** | **75** |
| ***WA1FCN** | **14** | **69,484** | **280** | **27** | **89** |
| *AA1M | " | 1,924 | 33 | 15 | 22 |
| **N2NT** | **A** | **5,760,576** | **3243** | **147** | **510** |
| **N2LT** | **"** | **4,354,880** | **2523** | **142** | **478** |
| **K2UA** | **"** | **3,913,946** | **2386** | **149** | **492** |
| N2GC | " | 2,346,060 | 1406 | 131 | 479 |
| K2NV | " | 2,142,520 | 1361 | 130 | 450 |
| W2XL | " | 1,510,076 | 1314 | 95 | 324 |
| N2MG | " | 1,445,159 | 1180 | 105 | 332 |
| K2FU | " | 1,288,332 | 1033 | 106 | 368 |
| W2LC | " | 1,270,256 | 987 | 116 | 380 |
| N2MR | " | 1,012,284 | 893 | 99 | 313 |
| WA2VYA | " | 914,914 | 745 | 107 | 350 |
| K2SHZ | " | 745,938 | 740 | 94 | 339 |
| N2CU | " | 555,450 | 577 | 91 | 259 |
| N2TN | " | 539,150 | 504 | 97 | 313 |
| KE2WY | " | 376,920 | 499 | 98 | 262 |
| W2EN | " | 275,362 | 398 | 68 | 194 |
| W2TN | " | 232,673 | 410 | 81 | 220 |
| NA2M | " | 230,251 | 348 | 72 | 187 |
| W2OO | " | 205,328 | 406 | 81 | 232 |
| W2FUI | " | 64,740 | 170 | 48 | 118 |
| N2VM | " | 33,184 | 124 | 37 | 85 |
| KB2FM | " | 23,968 | 85 | 32 | 80 |
| **NA2X** | **21** | **251,464** | **518** | **35** | **137** |
| **N2MF** | **14** | **472,644** | **1123** | **38** | **133** |
| K2XR | " | 425,000 | 942 | 38 | 132 |
| **W2VO** | **1.8** | **2,613** | **43** | **12** | **27** |
| ***W2WC** | **A** | **844,282** | **842** | **117** | **321** |
| *WB2DVU | " | 780,178 | 738 | 99 | 320 |
| *K2SZ | " | 527,040 | 616 | 81 | 279 |
| *KM2L | " | 516,810 | 571 | 80 | 242 |
| *K2UF | " | 461,745 | 535 | 82 | 249 |
| *K2CS | " | 448,301 | 534 | 88 | 255 |
| *W2TX | " | 429,936 | 502 | 86 | 232 |
| *W2YR | " | 394,134 | 476 | 87 | 239 |
| *K2UR | " | 287,390 | 403 | 63 | 227 |
| *K2AW | " | 236,360 | 395 | 61 | 200 |
| *WA2YSJ | " | 226,736 | 308 | 82 | 214 |
| *K2TWI | " | 153,036 | 307 | 50 | 168 |
| *WA2VQV | " | 124,605 | 253 | 52 | 143 |
| *WA2EYA | " | 113,870 | 229 | 57 | 136 |
| *KC2KEU | " | 113,836 | 235 | 56 | 135 |
| *W3BW/2 | " | 106,090 | 199 | 56 | 150 |
| *W2CVW | " | 89,870 | 164 | 65 | 150 |
| *W2XS | " | 85,646 | 186 | 62 | 125 |
| *K2TV | " | 75,150 | 197 | 51 | 116 |
| *K2UG | " | 69,647 | 232 | 66 | 191 |
| | | | | (Op: WA2JQK) | |
| *WA2IAU | " | 54,322 | 147 | 45 | 112 |
| *K2DI | " | 53,650 | 145 | 57 | 88 |
| *N2CG | " | 45,087 | 145 | 31 | 82 |
| *WW2P | " | 42,510 | 133 | 40 | 90 |
| *W2EZ | " | 36,736 | 202 | 35 | 93 |
| *WW2J | " | 32,136 | 120 | 29 | 75 |
| *K2YLH | " | 28,356 | 156 | 47 | 92 |
| *WA2BMH | " | 20,246 | 78 | 36 | 70 |
| *WB2DZH | " | 18,914 | 88 | 27 | 71 |
| *WB2BKO | " | 6,670 | 46 | 20 | 38 |
| *K2EL | " | 6,600 | 75 | 32 | 56 |
| ***K2MFY** | **28** | **139,384** | **389** | **28** | **124** |
| *WB2ABD | " | 48,776 | 172 | 21 | 83 |
| *K2SWZ | " | 4,320 | 44 | 19 | 29 |
| ***W2/UR5DEM** | **21** | **122,937** | **705** | **27** | **102** |
| *N2DBI | " | 2,100 | 54 | 12 | 38 |
| *KX2S | 14 | 16,745 | 100 | 23 | 62 |
| *W5KI/2 | 1.8 | 187 | 10 | 4 | 7 |
| **K3CR** | **A** | **4,853,225** | **2634** | **155** | **530** |
| | | | | (Op: LZ4AX) | |
| **AA1K/3** | **"** | **4,429,622** | **2642** | **153** | **493** |
| **K3ZO** | **"** | **4,415,784** | **2556** | **143** | **489** |
| **W3BGN** | **"** | **4,131,000** | **2383** | **154** | **494** |
| WF3J | " | 2,120,400 | 1337 | 127 | 443 |
| N3UM | " | 1,336,300 | 1190 | 99 | 316 |
| W3AP | " | 1,071,714 | 928 | 115 | 359 |
| K3ZM | " | 1,068,077 | 1002 | 96 | 325 |
| N3KR | " | 769,230 | 700 | 91 | 316 |
| W3AZ | " | 643,272 | 676 | 98 | 294 |
| W3BYX | " | 459,959 | 526 | 85 | 268 |
| K3OO | " | 431,815 | 463 | 90 | 245 |
| K3VA | " | 405,955 | 501 | 75 | 230 |
| K3GW | " | 404,952 | 443 | 90 | 269 |
| N3RJ | " | 363,623 | 550 | 83 | 254 |
| W3KV | " | 310,063 | 439 | 74 | 225 |
| W3GN | " | 266,823 | 365 | 84 | 203 |
| W3RJ | " | 212,787 | 407 | 54 | 159 |
| N3EA | " | 203,196 | 343 | 62 | 174 |
| W2CDO/3 | " | 123,213 | 267 | 54 | 147 |
| KB3TS | " | 106,144 | 205 | 61 | 153 |
| W3DAD | " | 86,848 | 176 | 57 | 127 |
| N3NZ | " | 66,000 | 171 | 49 | 101 |
| W3FQE | " | 13,570 | 150 | 34 | 81 |
| W3GH | " | 4,300 | 69 | 14 | 29 |
| **WY3T** | **14** | **91,791** | **286** | **33** | **108** |
| **W3TX** | **7** | **320,144** | **1000** | **32** | **104** |
| ***W3EF** | **A** | **1,685,880** | **1270** | **117** | **387** |
| ***K2YWE/3** | **"** | **1,454,400** | **1140** | **113** | **392** |
| *WW3S | " | 1,303,680 | 1000 | 117 | 368 |
| *N1WR/3 | " | 962,760 | 813 | 97 | 329 |
| *N3GJ | " | 890,766 | 752 | 101 | 325 |
| *KB3MM | " | 811,946 | 714 | 95 | 342 |
| *W3IUU | " | 627,173 | 637 | 89 | 270 |
| *N3FR | " | 579,493 | 613 | 94 | 273 |
| *K1EFI/3 | " | 555,004 | 572 | 78 | 278 |
| *N2US/3 | " | 471,128 | 546 | 81 | 248 |
| *KE3VV | " | 417,987 | 492 | 84 | 255 |
| *W3CP | " | 272,570 | 371 | 70 | 211 |
| *WA3SES | " | 263,578 | 385 | 82 | 199 |
| *NG3K | " | 220,864 | 346 | 57 | 181 |
| *AAØCY/3 | " | 166,410 | 297 | 56 | 159 |
| *N3WT | " | 133,556 | 266 | 55 | 138 |
| *KB3IEO | " | 121,380 | 241 | 55 | 149 |
| *W3BEN | " | 57,925 | 180 | 55 | 120 |
| *WK3H | " | 49,432 | 138 | 58 | 90 |
| *N3LL | " | 41,040 | 162 | 37 | 98 |
| *N3HCN | " | 36,176 | 141 | 45 | 88 |
| *WQ3E | " | 26,243 | 183 | 50 | 113 |
| *K3DSP | " | 20,703 | 85 | 36 | 67 |
| *K3EGE | " | 20,200 | 99 | 27 | 74 |
| *W3CB | " | 7,437 | 69 | 29 | 38 |
| *KF3CV | " | 4,182 | 70 | 29 | 53 |
| *WN3VAW | " | 2,520 | 30 | 20 | 25 |
| *W3GCW | " | 2,074 | 23 | 15 | 19 |
| *K3JHT | 28 | 2,940 | 50 | 9 | 26 |
| ***NS3T** | **7** | **45,100** | **195** | **21** | **79** |
| **K4ZW** | **A** | **4,930,744** | **2611** | **158** | **518** |
| **W4AN** | **"** | **4,599,609** | **2675** | **144** | **479** |
| | | | | (Op: K4BAI) | |
| W4RX | " | 2,888,808 | 1869 | 139 | 452 |
| N4GN | " | 2,656,232 | 1633 | 146 | 461 |
| WD4K | " | 2,442,825 | 1952 | 131 | 394 |
| | | | | (Op: KØEJ) | |
| N2AN/4 | " | 2,352,504 | 1694 | 118 | 418 |
| | | | | (Op: WC4E) | |
| K4RO | " | 2,307,816 | 1720 | 131 | 401 |
| N6AR/4 | " | 2,265,471 | 1496 | 138 | 465 |
| K4XU | " | 2,167,551 | 1575 | 145 | 382 |
| W4NZ | " | 1,976,076 | 1437 | 119 | 394 |
| K4WX | " | 1,909,148 | 1592 | 118 | 331 |
| W4YE | " | 1,708,217 | 1131 | 120 | 433 |
| AA4S | " | 1,445,260 | 1078 | 129 | 379 |
| W3BP/4 | " | 1,430,230 | 1186 | 103 | 342 |
| K4LTA | " | 1,311,255 | 1220 | 118 | 377 |
| W6NWS/4 | " | 1,297,296 | 1147 | 109 | 353 |
| W4DF | " | 1,197,840 | 919 | 117 | 379 |
| K4UVT | " | 1,162,304 | 956 | 113 | 395 |
| AA4NU | " | 1,139,349 | 1079 | 123 | 348 |
| | | | | (Op: KA1DWX) | |
| N4IR | " | 696,953 | 735 | 84 | 265 |
| K4XG | " | 506,577 | 492 | 106 | 287 |
| KO7X/4 | " | 497,511 | 517 | 96 | 275 |
| AA4V | " | 464,406 | 589 | 84 | 230 |
| W3VT/4 | " | 450,023 | 488 | 95 | 276 |
| N4MM | " | 380,564 | 429 | 99 | 257 |
| AA4NN | " | 337,689 | 479 | 67 | 230 |
| W3TMZ/4 | " | 333,775 | 354 | 100 | 295 |
| N4AA | " | 323,301 | 407 | 81 | 222 |
| W4AU | " | 315,282 | 428 | 72 | 209 |
| K4HA | " | 302,744 | 399 | 68 | 216 |
| KC4D | " | 299,136 | 558 | 86 | 218 |
| N4DJ | " | 235,928 | 334 | 84 | 224 |
| W4EI | " | 233,345 | 396 | 78 | 217 |
| AA3VA/4 | " | 197,353 | 322 | 62 | 159 |
| W7QF/4 | " | 191,520 | 312 | 86 | 199 |
| K4GMH | " | 184,552 | 360 | 53 | 183 |
| W4RK | " | 129,792 | 282 | 54 | 138 |
| N4TL | " | 74,772 | 177 | 55 | 131 |
| WB4MSG | " | 65,667 | 193 | 54 | 123 |
| W4LM | " | 41,210 | 134 | 38 | 92 |
| N4UH | " | 37,515 | 126 | 38 | 85 |
| KØCOP/4 | " | 34,798 | 120 | 43 | 84 |
| K1GG/4 | " | 31,571 | 111 | 41 | 90 |
| W4TE | " | 26,040 | 84 | 36 | 84 |
| KG4NYV | " | 22,523 | 100 | 33 | 68 |
| K5GFN/4 | " | 13,013 | 115 | 29 | 48 |
| | | | | (Op: AA4NN) | |
| N4PD | " | 9,734 | 64 | 22 | 40 |
| NC4S | " | 5,985 | 71 | 18 | 45 |
| W4UM | " | 133 | 10 | 9 | 10 |
| K4OH | " | 100 | 88 | 41 | 73 |
| **W4ZV** | **28** | **625,163** | **1399** | **33** | **128** |
| **N4BP** | **"** | **564,921** | **1418** | **32** | **115** |
| K4AMC | " | 192,439 | 535 | 30 | 101 |
| NU4Y | " | 166,600 | 441 | 28 | 112 |
| K1UM/4 | " | 69,377 | 340 | 27 | 92 |
| | | | | (Op: N1MM) | |
| **NO4S** | **21** | **424,501** | **1122** | **32** | **117** |
| **K4RV** | **"** | **371,910** | **849** | **34** | **131** |
| KW4DA | " | 50,600 | 162 | 24 | 86 |
| **K4NNN** | **14** | **282,438** | **746** | **35** | **118** |
| **KT3Y/4** | **7** | **569,712** | **1364** | **33** | **123** |
| K4TX | " | 150,822 | 420 | 28 | 105 |
| **NQ4I** | **3.5** | **78,100** | **302** | **27** | **83** |
| **K4DLJ** | **"** | **68,324** | **295** | **25** | **99** |
| **K4OAQ** | **"** | **37,966** | **223** | **17** | **65** |
| **K4TEA** | **1.8** | **4,214** | **44** | **13** | **30** |
| ***K1TO/4** | **A** | **4,141,188** | **2276** | **140** | **526** |
| ***K4GKD** | **"** | **1,756,601** | **1174** | **122** | **417** |
| ***NR3X/4** | **"** | **1,630,714** | **1325** | **115** | **408** |
| | | | | (Op: N4YDU) | |
| ***N4IG** | **"** | **1,611,922** | **1179** | **112** | **390** |
| *K4OGG | " | 1,309,098 | 1150 | 103 | 323 |
| *N4PSE | " | 1,208,613 | 1008 | 107 | 362 |
| *NA4K | " | 821,870 | 753 | 97 | 301 |
| *K4FPF | " | 753,525 | 679 | 94 | 331 |
| *K4IE | " | 619,392 | 634 | 100 | 284 |
| *N4NX | " | 585,088 | 510 | 114 | 334 |
| *K4MX | " | 526,563 | 544 | 92 | 277 |
| *W4PM | " | 458,935 | 504 | 84 | 265 |
| *K1KO/4 | " | 424,350 | 530 | 85 | 260 |
| *WD4AHZ | " | 336,150 | 514 | 54 | 171 |
| *K4BEV | " | 317,317 | 417 | 94 | 223 |
| *KN4Y | " | 247,680 | 412 | 70 | 188 |
| *N4XU | " | 231,609 | 362 | 78 | 191 |
| *KU8E/4 | " | 220,704 | 339 | 77 | 187 |
| *KI3O/4 | " | 185,244 | 326 | 65 | 193 |
| *K4QPL | " | 167,399 | 291 | 62 | 167 |
| *AE4Y | " | 160,540 | 263 | 63 | 167 |
| *KB4N | " | 144,866 | 260 | 67 | 159 |
| *W4ZYT | " | 140,367 | 246 | 55 | 158 |
| *NX9T/4 | " | 138,885 | 265 | 71 | 164 |
| *N4EK | " | 133,694 | 282 | 59 | 147 |
| *N4PQX | " | 125,928 | 233 | 53 | 145 |
| *W4DD | " | 123,993 | 233 | 64 | 143 |
| *N4JED | " | 121,746 | 241 | 52 | 145 |
| *WB4DNL | " | 105,152 | 202 | 64 | 148 |
| *KC4/N2TA | " | 89,380 | 285 | 39 | 70 |
| | | | | (Op: RW1AI) | |
| *W4IHI | " | 87,287 | 200 | 59 | 132 |
| *W4TYU | " | 81,600 | 214 | 64 | 128 |
| *K6ETM/4 | " | 79,413 | 183 | 55 | 137 |
| *W4SD | " | 74,025 | 193 | 48 | 127 |
| *K4CNW | " | 52,895 | 165 | 42 | 107 |
| *K2UFT/4 | " | 51,337 | 141 | 51 | 92 |
| *K4LW | " | 44,896 | 146 | 39 | 83 |
| *N4WD | " | 44,022 | 166 | 60 | 114 |
| *K4HV | " | 39,520 | 122 | 42 | 88 |
| *AF4OX | " | 28,815 | 99 | 45 | 68 |
| *N8IK/4 | " | 27,246 | 160 | 44 | 70 |
| *AA4KD | " | 26,536 | 103 | 44 | 80 |
| *W4HZD | " | 24,750 | 208 | 52 | 98 |
| *KI4VB | " | 20,860 | 125 | 54 | 86 |
| *N4NTO | " | 18,090 | 85 | 35 | 55 |
| *KU3O/4 | " | 16,109 | 74 | 38 | 51 |
| *W4YA | " | 15,190 | 75 | 39 | 59 |
| *K4JAF | " | 7,275 | 52 | 30 | 45 |
| *K4GA | " | 4,416 | 49 | 29 | 40 |
| *W4OGG | " | 4,355 | 53 | 24 | 41 |
| *K4NYS | " | 2,592 | 49 | 16 | 38 |
| *K4YJ | " | 1,496 | 27 | 18 | 26 |
| *K4WES | " | 1,176 | 24 | 18 | 24 |
| *K4ZZT | " | 660 | 14 | 11 | 11 |
| *W4YN | " | 480 | 30 | 15 | 25 |
| *KO4OL | " | 325 | 15 | 13 | 12 |
| *KA6R/4 | " | 100 | 101 | 37 | 67 |
| ***WB4TDH** | **28** | **285,640** | **683** | **31** | **117** |
| ***ND4AA** | **"** | **158,766** | **457** | **30** | **111** |
| ***WO4O** | **"** | **145,122** | **394** | **28** | **106** |
| *K4FXN | " | 117,519 | 340 | 28 | 101 |
| *K4GHS | " | 98,048 | 295 | 25 | 103 |
| *W4HM | " | 90,112 | 272 | 28 | 100 |
| *K6EID/4 | " | 69,960 | 250 | 23 | 83 |
| ***N4MO** | **21** | **321,672** | **769** | **33** | **123** |
| *W4BAA | 14 | 14,744 | 90 | 21 | 55 |
| ***W4IDX** | **7** | **31,623** | **145** | **20** | **63** |
| *N4JF | " | 20,176 | 156 | 23 | 74 |
| ***K4WI** | **1.8** | **246,411** | **681** | **29** | **102** |
| *W9IXX/4 | " | 140 | 12 | 6 | 8 |
| **N5RZ** | **A** | **3,999,360** | **2514** | **157** | **483** |
| **K5GN** | **"** | **3,963,960** | **2459** | **165** | **495** |
| **W5KFT** | **"** | **2,769,882** | **1926** | **146** | **427** |
| | | | | (Op: K5PI) | |
| K5YA | " | 2,607,660 | 1985 | 124 | 371 |
| N5PO | " | 1,249,440 | 990 | 126 | 354 |
| N5HI | " | 394,880 | 488 | 98 | 222 |
| N5OT | " | 380,808 | 475 | 104 | 224 |
| W5OM | " | 333,268 | 493 | 93 | 245 |
| N5PA | " | 266,660 | 387 | 94 | 241 |
| AB5C | " | 186,459 | 297 | 80 | 193 |
| WF5W | " | 56,134 | 320 | 81 | 173 |
| K5RA | " | 45,568 | 154 | 40 | 88 |
| K5ZO | " | 40,278 | 161 | 56 | 81 |
| W5BBR | " | 19,467 | 78 | 40 | 63 |
| **N5YA** | **21** | **466,310** | **1017** | **35** | **135** |
| | | | | (Op: AD5Q) | |
| K2BA/5 | " | 341,359 | 893 | 33 | 116 |
| **W5MX** | **14** | **169,524** | **440** | **34** | **119** |
| **N5RG** | **3.5** | **39,900** | **201** | **24** | **71** |
| W5FO | " | 16,880 | 148 | 22 | 58 |
| AF5Z | " | 5,076 | 47 | 14 | 33 |
| ***N5AW** | **A** | **2,346,861** | **1411** | **149** | **478** |
| ***N5DO** | **"** | **1,199,055** | **1001** | **124** | **349** |
| *WD5K | " | 1,018,344 | 851 | 118 | 335 |
| *K5WA | " | 215,760 | 292 | 90 | 220 |
| *N5XZ | " | 196,779 | 380 | 78 | 189 |
| *N5CHA | " | 153,690 | 268 | 73 | 145 |
| *K5UV | " | 122,111 | 273 | 64 | 123 |
| *N5PU | " | 116,100 | 298 | 57 | 158 |
| *WA5SOG | " | 113,206 | 235 | 69 | 145 |
| *K5GM | " | 81,880 | 188 | 67 | 111 |
| *K5WAF | " | 42,050 | 134 | 45 | 100 |
| *KM5WR | " | 31,236 | 108 | 40 | 74 |
| *NO5W | " | 17,630 | 84 | 30 | 56 |
| *N5NJ | " | 15,400 | 75 | 34 | 54 |
| *AE5NL | " | 4,784 | 46 | 17 | 35 |
| *W5CWO | " | 100 | 136 | 28 | 30 |
| ***K5RX** | **28** | **298,144** | **757** | **38** | **124** |
| *W5MK | " | 25,456 | 132 | 25 | 49 |
| ***K5NX** | **21** | **43,659** | **196** | **26** | **73** |
| **N6RO** | **A** | **2,950,299** | **2245** | **163** | **398** |
| **N6XI** | **"** | **1,721,280** | **1493** | **132** | **308** |
| **N7CW/6** | **"** | **1,336,886** | **959** | **136** | **385** |
| W6EEN | " | 1,323,728 | 1118 | 128 | 318 |
| | | | | (Op: N6RT) | |
| N6HR | " | 1,072,624 | 974 | 130 | 297 |
| W6UM | " | 906,019 | 659 | 146 | 375 |
| WA5VGI/6 | " | 552,682 | 594 | 114 | 263 |
| N6TW | " | 486,542 | 570 | 99 | 223 |
| K6LRN | " | 336,640 | 414 | 104 | 216 |
| N6AV | " | 170,312 | 278 | 75 | 169 |
| AD6WL | " | 167,400 | 278 | 85 | 163 |
| N6VH | " | 138,936 | 296 | 73 | 95 |
| W6WIZ | " | 88,641 | 268 | 61 | 128 |
| W6FRH | " | 55,577 | 148 | 65 | 84 |
| WA6URY | " | 52,681 | 167 | 51 | 88 |
| K6GT | " | 42,984 | 152 | 47 | 61 |
| W6MVW | " | 36,442 | 124 | 56 | 77 |
| K6HRT | " | 18,746 | 108 | 40 | 63 |
| W1HDO/6 | " | 15,244 | 91 | 32 | 42 |
| K6CTA | " | 14,784 | 76 | 35 | 53 |
| KS6H | " | 12,349 | 89 | 23 | 30 |
| AJ6V | " | 1,504 | 22 | 14 | 18 |
| **WØYK/6** | **28** | **219,880** | **780** | **32** | **83** |
| N6ZB | " | 23,625 | 145 | 21 | 42 |
| **W6YA** | **21** | **440,916** | **947** | **38** | **136** |
| KC6X | " | 172,824 | 440 | 32 | 120 |
| W6DCC | " | 74,806 | 284 | 29 | 84 |
| **N6RZ** | **14** | **96,879** | **297** | **31** | **98** |
| K6NY | " | 33,147 | 163 | 23 | 64 |
| **K6TA** | **7** | **140,855** | **425** | **33** | **110** |
| W6EU | " | 34,272 | 144 | 27 | 75 |
| **K6SE** | **1.8** | **1,380** | **32** | **10** | **13** |
| ***N6NF** | **A** | **871,578** | **864** | **119** | **250** |
| ***K6XV** | **"** | **592,592** | **720** | **117** | **259** |
| *WN6K | " | 411,320 | 672 | 88 | 172 |
| *K6UM | " | 212,976 | 338 | 84 | 148 |
| *N6EM | " | 188,742 | 382 | 98 | 151 |
| *W6RFF | " | 171,465 | 331 | 80 | 133 |
| *WW6D | " | 164,832 | 310 | 76 | 126 |
| *WA6BFW | " | 133,665 | 445 | 84 | 117 |
| *W6NKR | " | 130,410 | 253 | 76 | 134 |
| *AA6EE | " | 128,838 | 320 | 75 | 122 |
| *W3SE/6 | " | 94,985 | 244 | 65 | 92 |
| *AA6PW | " | 79,910 | 259 | 49 | 73 |
| *WA6OGO | " | 78,242 | 210 | 57 | 85 |
| *AD6G | " | 65,349 | 172 | 49 | 110 |
| *W6OUL | " | 58,653 | 190 | 55 | 78 |
| *W6SJ | " | 51,842 | 192 | 67 | 94 |
| *K6OWL | " | 47,736 | 191 | 51 | 57 |
| *K6CSL | " | 43,506 | 166 | 57 | 71 |
| *W6IYS | " | 40,880 | 152 | 41 | 71 |
| *AA6DX | " | 37,376 | 194 | 60 | 86 |
| *WDØAVV/6 | " | 34,001 | 185 | 52 | 69 |
| *W6KY | " | 33,696 | 130 | 47 | 61 |
| *N6GL | " | 26,535 | 117 | 43 | 44 |
| *KE6QR | " | 21,141 | 111 | 34 | 53 |
| *WA6BOB | " | 20,640 | 110 | 44 | 52 |
| *NK6A | " | 18,942 | 96 | 32 | 50 |
| *K6DGW | " | 6,435 | 60 | 26 | 39 |
| *WA6PX | " | 6,035 | 74 | 34 | 37 |
| *K6LDX | " | 3,552 | 30 | 21 | 27 |
| *KD6UW | " | 2,665 | 23 | 19 | 22 |
| ***N6RV** | **28** | **114,456** | **424** | **29** | **85** |
| *W6VNR | " | 29,484 | 222 | 26 | 52 |
| ***N6MU** | **21** | **295,840** | **659** | **35** | **125** |
| *AE9F/6 | " | 51,057 | 222 | 29 | 64 |
| ***NJ6P** | **14** | **65,660** | **271** | **35** | **99** |
| *KU6T | " | 23,908 | 135 | 27 | 59 |
| *WD6DX | " | 17,958 | 127 | 23 | 50 |
| ***WA6IQM** | **7** | **59,115** | **221** | **32** | **73** |
| **W2VJN/7** | **A** | **2,340,954** | **1616** | **157** | **406** |
| **K7KU** | **"** | **2,126,580** | **1720** | **132** | **328** |
| | | | | (Op: KØKR) | |
| **W7GG** | **"** | **2,077,416** | **1781** | **136** | **337** |
| K7NV | " | 1,804,410 | 1491 | 139 | 350 |
| WA7LT | " | 1,402,961 | 1390 | 128 | 285 |
| K7ZZ | " | 1,361,956 | 1420 | 127 | 271 |
| KG7H | " | 1,155,360 | 1109 | 123 | 292 |
| AC7LX | " | 1,061,341 | 947 | 123 | 298 |
| K7ZA | " | 745,627 | 747 | 109 | 264 |
| WI7N | " | 515,698 | 594 | 113 | 218 |
| K7ABV | " | 502,293 | 582 | 96 | 245 |
| W7YS | " | 501,809 | 546 | 96 | 247 |
| K7BTW | " | 415,872 | 526 | 90 | 214 |
| W7LR | " | 328,758 | 409 | 105 | 209 |
| W7ON | " | 284,109 | 454 | 91 | 158 |
| NE9Z/7 | " | 219,128 | 283 | 108 | 236 |
| AB7RW | " | 218,530 | 395 | 81 | 124 |
| W7IIT | " | 179,557 | 379 | 84 | 143 |
| KC7UP | " | 121,716 | 272 | 64 | 132 |
| N7JXS | " | 81,312 | 198 | 61 | 107 |
| W7LGG | " | 80,460 | 389 | 79 | 197 |
| KS7T | " | 77,616 | 203 | 54 | 100 |
| KØTO/7 | " | 46,512 | 164 | 48 | 88 |
| K7DZ | " | 29,529 | 173 | 73 | 120 |
| **N7DD** | **21** | **392,450** | **1013** | **36** | **131** |
| W7AYY | " | 9,576 | 55 | 19 | 44 |
| **N7WA** | **14** | **392,496** | **1058** | **38** | **118** |
| K7QX | " | 320,908 | 816 | 35 | 122 |
| W3AS/7 | 7 | 3,267 | 36 | 9 | 24 |
| N7IR | 3.5 | 2,760 | 39 | 12 | 18 |
| W7DRA | " | 931 | 38 | 9 | 10 |
| ***K7HBN** | **A** | **634,385** | **652** | **108** | **247** |
| ***W7YAQ** | **"** | **608,295** | **598** | **112** | **267** |
| ***KI7Y** | **"** | **499,168** | **617** | **98** | **206** |
| *W7QDM | " | 237,938 | 363 | 92 | 179 |
| *N7ZN | " | 144,760 | 274 | 68 | 120 |
| *NG7Z | " | 73,556 | 201 | 53 | 89 |
| *W7GTO | " | 66,308 | 228 | 56 | 81 |
| *KX7J | " | 64,350 | 177 | 48 | 117 |
| *W7SNH | " | 50,820 | 195 | 55 | 99 |
| *N7UK | " | 36,075 | 125 | 44 | 67 |
| *W7LKG | " | 31,500 | 123 | 37 | 68 |
| *W7ZMD | " | 27,838 | 167 | 20 | 42 |
| *N7WO | " | 25,155 | 95 | 52 | 77 |
| *KU7T | " | 841 | 24 | 13 | 16 |
| *W7SST | " | 595 | 82 | 18 | 17 |
| *N7AS | " | 20 | 2 | 2 | 2 |
| ***KA7FEF** | **28** | **336** | **37** | **10** | **14** |
| *KI7LS | " | 10 | 10 | 8 | 8 |
| ***K7LAY** | **21** | **59,622** | **235** | **31** | **83** |
| ***KA7T** | **14** | **104,528** | **325** | **34** | **105** |
| ***WA6IQM/7** | **7** | **69,397** | **211** | **32** | **75** |
| **K8GL** | **A** | **2,769,144** | **1616** | **145** | **477** |
| **N4ZR/8** | **"** | **2,074,325** | **1557** | **116** | **359** |
| KT8X | " | 1,115,310 | 878 | 126 | 344 |
| K2UOP/8 | " | 771,684 | 705 | 104 | 324 |
| W8UD | " | 485,438 | 538 | 99 | 247 |
| N8MZ | " | 470,428 | 512 | 101 | 270 |
| KE8M | " | 453,789 | 481 | 81 | 262 |
| K8JQ | " | 389,300 | 483 | 91 | 249 |
| K8DQL | " | 258,520 | 366 | 84 | 197 |
| N8PW | " | 248,310 | 419 | 72 | 195 |
| W8PN | " | 204,624 | 360 | 65 | 167 |
| W8TWA | " | 74,094 | 183 | 45 | 114 |
| N8XP | " | 100 | 174 | 39 | 99 |
| **N9AG/8** | **28** | **471,274** | **1055** | **33** | **133** |
| **W8AEF** | **3.5** | **9,486** | **128** | **19** | **43** |
| K8MD | " | 9,216 | 77 | 15 | 49 |
| ***K5IID/8** | **A** | **934,816** | **826** | **108** | **338** |
| ***W8IQ** | **"** | **911,364** | **808** | **109** | **330** |
| *K3JT/8 | " | 400,140 | 515 | 78 | 207 |
| *K8IA | " | 386,513 | 535 | 101 | 206 |
| *KC8FS | " | 380,400 | 471 | 82 | 235 |
| *W8GOC | " | 340,463 | 449 | 82 | 225 |
| *N8AA | " | 66,906 | 168 | 50 | 112 |
| *W8IDM | " | 66,120 | 164 | 50 | 102 |
| *N8EW | " | 60,236 | 162 | 48 | 100 |
| *WB8TLI | " | 59,332 | 147 | 62 | 101 |
| *KG8ZD | " | 53,436 | 156 | 50 | 96 |
| *AD8P | " | 46,816 | 140 | 56 | 96 |
| *K8MEG | " | 42,746 | 140 | 50 | 84 |
| *K8KU | " | 41,769 | 134 | 35 | 84 |
| *N8WS | " | 27,132 | 233 | 64 | 140 |
| *W8RJL | " | 10,375 | 56 | 34 | 49 |
| *K8VUS | " | 3,575 | 39 | 23 | 32 |
| *KD8RB | " | 624 | 56 | 12 | 36 |
| ***N8II** | **28** | **224,564** | **641** | **23** | **101** |
| *KV8Q | " | 71,224 | 285 | 25 | 91 

| | | | | | |
|---|---|---|---|---|---|
| *K2HT/Ø | * | 16,536 | 87 | 47 | 57 |
| *NØEO | * | 6,984 | 50 | 32 | 40 |
| *WBØB | * | 4,067 | 81 | 37 | 46 |
| *WØTY | * | 3,344 | 47 | 18 | 20 |
| *KØTRL | * | 2,668 | 31 | 20 | 26 |
| *NZ4DX/Ø | * | 488 | 60 | 29 | 32 |
| *KØCO | * | 306 | 13 | 9 | 9 |
| *KCØATC | * | 192 | 49 | 22 | 26 |
| ***K7RE/Ø** | **21** | **56,500** | **326** | **24** | **76** |
| ***KJØB** | **7** | **31,850** | **143** | **23** | **68** |
| *WN8P/Ø | * | 3,891 | 41 | 17 | 29 |
| **ALASKA** | | | | | |
| **KL7XX** | **A** | **536,400** | **783** | **95** | **205** |
| KL7WV | * | 380,712 | 1063 | 79 | 95 |
| | | | (Op: W3YQ) | | |
| KL7FH | * | 298,224 | 1055 | 62 | 82 |
| ***KL7AC** | **A** | **123,930** | **530** | **43** | **59** |
| **ANTIGUA** | | | | | |
| ***V26K** | **A** | **8,018,582** | **5555** | **131** | **452** |
| | | | (Op: AA3B) | | |
| ***V21CW** | **28** | **220,915** | **834** | **26** | **89** |
| | | | (Op: N4GM) | | |
| **BARBADOS** | | | | | |
| **8P5A** | **A** | **8,521,143** | **6250** | **131** | **448** |
| | | | (Op: W2SC) | | |
| **BERMUDA** | | | | | |
| ***VP9/W6PH** | **A** | **3,950,969** | **3743** | **108** | **365** |
| *VP9/WA3AAN | * | 92,349 | 586 | 32 | 61 |
| **CANADA** | | | | | |
| **VE1ZJ** | **3.5** | **129,780** | **588** | **19** | **84** |
| VE9HC | * | 18,560 | 123 | 12 | 52 |
| ***VE1RGB** | **A** | **546,150** | **804** | **72** | **258** |
| ***VO1NA** | **28** | **27,300** | **180** | **21** | **84** |
| *VE1AOE | * | 26,664 | 336 | 10 | 34 |
| ***VO1MP** | **21** | **414,834** | **1165** | **31** | **116** |
| **VE2IM** | **A** | **6,862,742** | **4803** | **131** | **476** |
| | | | (Op: VE3DZ) | | |
| **VY2TT** | **"** | **5,566,000** | **4225** | **128** | **422** |
| | | | (Op: K6LA) | | |
| VE2AYU | * | 1,614,327 | 1618 | 98 | 331 |
| ***VE2AWR** | **A** | **1,201,258** | **1527** | **84** | **265** |
| *VE2DO | * | 297,705 | 469 | 73 | 194 |
| *VE2FFE | * | 45,955 | 257 | 34 | 57 |
| *VE2OWL | * | 27,166 | 114 | 24 | 70 |
| *VE2SB | 14 | 4,408 | 82 | 14 | 24 |
| **VE3EJ** | **A** | **5,361,885** | **3569** | **153** | **492** |
| **VE3AT** | **"** | **4,572,720** | **3249** | **139** | **445** |
| VA3UA | * | 2,771,153 | 2574 | 120 | 373 |
| VE3KZ | * | 1,387,765 | 1327 | 110 | 323 |
| VE3PN | * | 1,184,980 | 1519 | 99 | 259 |
| VE3AMX | * | 446,368 | 845 | 67 | 165 |
| VE3MM | * | 49,104 | 228 | 62 | 114 |
| VA3SPN | 28 | 44 | 13 | 9 | 13 |
| **VA3SY** | **14** | **42,084** | **576** | **21** | **42** |
| VE3PND | 7 | 12,245 | 71 | 19 | 60 |
| ***VE3XB** | **A** | **2,117,664** | **1782** | **119** | **394** |
| ***VE3KP** | **"** | **1,266,288** | **1549** | **97** | **271** |
| *VE3CR | * | 785,916 | 842 | 99 | 284 |
| *VE3BUC | * | 466,947 | 639 | 74 | 233 |
| *VE3OM | * | 465,465 | 518 | 81 | 260 |
| *VE3FWA | * | 446,586 | 711 | 68 | 226 |
| *VA3DX | * | 372,500 | 577 | 80 | 218 |
| *VA3TEE | * | 336,072 | 530 | 70 | 194 |
| *VE3GFN | * | 316,050 | 540 | 67 | 191 |
| *VE3HG | * | 255,024 | 445 | 61 | 192 |
| *VA3XRZ | * | 178,542 | 369 | 60 | 158 |
| *VE3JCV | * | 159,858 | 325 | 65 | 149 |
| *VA3WN | * | 149,792 | 493 | 52 | 99 |
| *VE3JAQ | * | 107,659 | 476 | 61 | 138 |
| *VA3IX | * | 105,774 | 367 | 58 | 125 |
| *VA3PL | * | 86,395 | 233 | 56 | 129 |
| *VE3LFA | * | 18,810 | 106 | 40 | 74 |
| *VA3RJ | * | 18,423 | 98 | 34 | 55 |
| *VE3OSZ | * | 16,310 | 100 | 15 | 55 |
| *VE3AGC | * | 8,037 | 256 | 65 | 106 |
| *VA3HUN | * | 1,860 | 43 | 17 | 14 |
| *VA3SWG | * | 228 | 16 | 7 | 5 |
| ***VE3FU** | **7** | **133,168** | **553** | **26** | **86** |
| *VA3SK | * | 12,879 | 118 | 15 | 38 |
| ***VE3XAX** | **1.8** | **12,064** | **416** | **7** | **9** |
| **VE4IM** | **A** | **350,403** | **593** | **94** | **177** |
| ***VE4XT** | **A** | **78,000** | **420** | **46** | **58** |
| ***VE4VV** | **21** | **271,750** | **1010** | **32** | **93** |
| VE5CPU | A | 4,664 | 68 | 21 | 23 |
| ***VE5SF** | **A** | **607,590** | **1160** | **84** | **174** |
| ***VE5ZX** | **21** | **173,026** | **737** | **28** | **91** |
| *VE5AAD | * | 3,808 | 84 | 13 | 21 |
| **VE5UA/6** | **A** | **1,034,475** | **1625** | **100** | **225** |
| **VE6JY** | **21** | **753,640** | **1853** | **36** | **130** |
| | | | (Op: VA7RR) | | |
| **VE6EX** | **14** | **383,265** | **1319** | **33** | **102** |
| | | | (Op: VE6JY) | | |
| **VE6WQ** | **7** | **344,201** | **1123** | **33** | **110** |
| ***VE6TN** | **A** | **841,100** | **1210** | **101** | **224** |
| **VE7VR** | **A** | **772,409** | **1407** | **90** | **163** |
| VE7ZBK | 21 | 1,404 | 45 | 16 | 20 |
| **VE7XR** | **14** | **416,850** | **1250** | **36** | **114** |
| VA7XX | * | 39,438 | 131 | 33 | 93 |
| ***VE7XF** | **A** | **1,009,120** | **1265** | **108** | **232** |
| *VE7FO | * | 432,497 | 865 | 80 | 141 |
| *VE7IN | * | 325,160 | 667 | 85 | 135 |
| *VE7ASK | * | 288,351 | 665 | 78 | 129 |
| *VE7YU | * | 28,197 | 99 | 52 | 65 |
| ***VA7LC** | **21** | **65,472** | **469** | **26** | **40** |
| *VE7NI | * | 51,858 | 269 | 24 | 62 |
| **CAYMAN ISLANDS** | | | | | |
| **ZF2NT** | **21** | **1,290,879** | **3184** | **36** | **135** |
| | | | (Op: N6NT) | | |
| **COSTA RICA** | | | | | |
| **TI3/YN8TLS** | **14** | **241,074** | **1415** | **28** | **90** |
| **CUBA** | | | | | |
| ***CO8TW** | **14** | **35,904** | **153** | **25** | **77** |
| **DOMINICAN REPUBLIC** | | | | | |
| ***HI8RV** | **A** | **445,984** | **987** | **58** | **156** |
| *HI3LFE | * | 226,769 | 671 | 51 | 121 |
| *HI8ROX | 14 | 1,586 | 30 | 11 | 15 |
| **GREENLAND** | | | | | |
| *0X3FV | A | 384 | 9 | 7 | 9 |
| **GUATEMALA** | | | | | |
| ***TG4/WØIZ** | **A** | **861,126** | **2055** | **71** | **132** |
| **JAMAICA** | | | | | |
| **6Y8A** | **3.5** | **207,603** | **1022** | **23** | **76** |
| | | | (Op: N6BT) | | |
| **MARTINIQUE** | | | | | |
| **FM5GU** | **1.8** | **112,651** | **772** | **16** | **61** |
| ***FM5BH** | **A** | **6,788,900** | **5260** | **131** | **449** |
| | | | (Op: K9PG) | | |
| **MEXICO** | | | | | |
| **XE1MM** | **A** | **1,615,756** | **2631** | **90** | **208** |
| ***6J2MX** | **A** | **294,768** | **550** | **86** | **181** |
| *6J2AUB | * | 6,226 | 122 | 18 | 18 |
| | | | (Op: XE2AUB) | | |
| ***6J2AC** | **7** | **47,658** | **566** | **18** | **29** |
| **NICARAGUA** | | | | | |
| *HT9T | 3.5 | 14,310 | 313 | 11 | 16 |
| | | | (Op: YN4SU) | | |
| **PANAMA** | | | | | |
| **HP1XVH** | **21** | **1,473,683** | **3775** | **34** | **129** |
| ***HP3XUG** | **A** | **314,824** | **672** | **69** | **163** |
| ***HP1AC** | **28** | **70,577** | **370** | **23** | **66** |
| **PUERTO RICO** | | | | | |
| ***KP4JRS** | **A** | **68,208** | **176** | **44** | **103** |
| *WP4LNY | * | 23,650 | 377 | 28 | 27 |
| **ST. KITTS & NEVIS** | | | | | |
| **V47KP** | **A** | **1,889,325** | **2440** | **105** | **300** |
| | | | (Op: W2OX) | | |
| **SAINT MARTIN** | | | | | |
| ***FS/KM3T** | **A** | **5,608,350** | **4573** | **122** | **393** |
| **TURKS & CAICOS ISLANDS** | | | | | |
| **VP5V** | **A** | **5,019,368** | **5123** | **119** | **342** |
| | | | (Op: W5AO) | | |
| **U.S. VIRGIN ISLANDS** | | | | | |
| **KP2/OK1TN** | **21** | **705,159** | **2218** | **31** | **116** |
| **KP2/OK1CW** | **3.5** | **217,737** | **962** | **26** | **91** |

## AFRICA

| | | | | | |
|---|---|---|---|---|---|
| **ASCENSION ISLAND** | | | | | |
| **ZD8A** | **A** | **8,611,610** | **5011** | **146** | **456** |
| | | | (Op: K6NA) | | |
| **CANARY ISLANDS** | | | | | |
| ***EA8CN** | **A** | **3,353,336** | **2297** | **103** | **411** |
| *EA8/ES6DO | * | 858,976 | 1168 | 76 | 196 |
| *EA8DA | * | 275,184 | 407 | 71 | 181 |
| *EA8BIE | * | 173,840 | 348 | 56 | 156 |
| ***EA8/OH2NC** | **21** | **375,165** | **1023** | **30** | **105** |
| *EC8ABC | * | 8,851 | 77 | 14 | 39 |
| ***EA8AVK** | **14** | **191,052** | **669** | **22** | **86** |
| *EA8NQ | * | 128,260 | 420 | 24 | 86 |
| **CAPE VERDE** | | | | | |
| **D4B** | **A** | **8,833,792** | **5146** | **137** | **431** |
| | | | (Op: 4L5A) | | |
| **EQUATORIAL GUINEA** | | | | | |
| ***3C2MV** | **A** | **816,480** | **1405** | **61** | **149** |
| **MADEIRA ISLANDS** | | | | | |
| ***CT3EE** | **A** | **6,964,784** | **4159** | **131** | **453** |
| | | | (Op: DF4SA) | | |
| *CT3KN | * | 2,822,820 | 2321 | 94 | 361 |
| ***CT3KU** | **21** | **46,280** | **253** | **19** | **70** |
| **MAURITIUS** | | | | | |
| ***3B8CF** | **A** | **96,566** | **327** | **36** | **70** |
| | | | (Op: DL7VOA) | | |
| **MOROCCO** | | | | | |
| **CN2R** | **A** | **6,346,630** | **3934** | **126** | **464** |
| | | | (Op: W7EJ) | | |
| ***CN8YR** | **A** | **1,088,845** | **1458** | **68** | **227** |
| **NIGERIA** | | | | | |
| ***5NØNHD** | **A** | **215,424** | **439** | **55** | **132** |
| | | | (Op: JK1UWY) | | |
| ***5NØW** | **14** | **283,745** | **848** | **29** | **92** |
| **SAO TOME & PRINCIPE** | | | | | |
| ***S9MX** | **A** | **5,303,090** | **3744** | **116** | **378** |
| | | | (Op: K1XM) | | |
| **SENEGAL** | | | | | |
| **6V6U** | **A** | **8,765,820** | **5458** | **129** | **438** |
| | | | (Op: K3IPK) | | |
| **SIERRA LEONE** | | | | | |
| **9L1AB** | **A** | **7,950,840** | **4893** | **139** | **451** |
| | | | (Op: G3AB) | | |
| **SOUTH AFRICA** | | | | | |
| ZS6KR | 3.5 | 3,081 | 43 | 16 | 23 |
| ***ZSØE** | **A** | **103,212** | **303** | **53** | **88** |
| | | | (Op: ZS6AJS) | | |
| *ZSØM | * | 3,256 | 29 | 16 | 28 |
| *ZS5NK | 28 | 2,024 | 64 | 15 | 29 |
| ***ZS6EGB** | **21** | **28,512** | **288** | **24** | **57** |
| *ZS4U | * | 16,029 | 184 | 16 | 23 |
| ***ZS6MG** | **7** | **86,020** | **276** | **30** | **80** |
| **WESTERN SAHARA** | | | | | |
| ***SØ7PM** | **A** | **1,848,832** | **1861** | **83** | **285** |
| | | | (Op: G3WQU) | | |
| **ZAIRE** | | | | | |
| **9S1X** | **28** | **242,522** | **984** | **29** | **90** |
| | | | (Op: F6BLQ) | | |

## ASIA

| | | | | | |
|---|---|---|---|---|---|
| **ASIATIC RUSSIA** | | | | | |
| **UA9CLB** | **A** | **3,817,528** | **2752** | **123** | **394** |
| **RW9OWD** | **"** | **3,089,856** | **2334** | **124** | **408** |
| | | | (Op: N6ZZ) | | |
| **RA9WW** | **"** | **2,075,457** | **1623** | **107** | **384** |
| RU9CZD | * | 2,029,944 | 1364 | 134 | 428 |
| | | | (Op: UA9CDC) | | |
| RW9SW | * | 1,839,110 | 1525 | 111 | 359 |
| UA9BS | * | 1,634,988 | 1468 | 103 | 323 |
| UA9JKA | * | 1,502,160 | 1288 | 104 | 336 |
| RW9UW | * | 1,233,696 | 1364 | 91 | 271 |
| RZ9AE | * | 1,170,018 | 1131 | 101 | 322 |
| RV9XO | * | 944,262 | 933 | 102 | 316 |
| RX9TX | * | 455,304 | 639 | 89 | 222 |
| UA9KJ | * | 445,257 | 839 | 62 | 177 |
| UA9FM | * | 431,244 | 604 | 86 | 238 |
| UA9KM | * | 314,754 | 556 | 82 | 169 |
| UA9OS | * | 60,291 | 179 | 57 | 132 |
| **RA9UV** | **28** | **93,400** | **464** | **21** | **79** |
| RX9LW | * | 61,683 | 337 | 20 | 67 |
| **UA9AYA** | **14** | **751,284** | **1803** | **37** | **127** |
| | | | (Op: UA9BA) | | |
| UA9CCL | * | 143,335 | 487 | 27 | 82 |
| **UA9ZZ** | **7** | **387,162** | **1222** | **31** | **106** |
| **UA9SP** | **3.5** | **155,232** | **656** | **23** | **76** |
| UA9OC | * | 97,929 | 456 | 19 | 74 |
| RA9MA | * | 26,368 | 182 | 11 | 53 |
| ***UA9OA** | **A** | **1,242,095** | **1208** | **93** | **322** |
| ***RN9RZ** | **"** | **1,130,956** | **1128** | **103** | **334** |
| ***RW9QA** | **"** | **1,113,009** | **1197** | **74** | **279** |
| *RA9DZ | * | 1,001,318 | 1041 | 90 | 289 |
| *RA9XF | * | 953,568 | 1079 | 78 | 258 |
| *UA9JLL | * | 811,840 | 940 | 72 | 248 |
| *UA9AX | * | 593,832 | 590 | 107 | 347 |
| *RX9FB | * | 515,568 | 590 | 89 | 279 |
| *RK9CR | * | 391,977 | 650 | 68 | 223 |
| *UA9HN | * | 389,240 | 623 | 64 | 199 |
| *RZ9CX | * | 319,680 | 376 | 83 | 277 |
| *RA9FF | * | 216,140 | 476 | 47 | 155 |
| *UA9CR | * | 215,004 | 400 | 60 | 168 |
| *RW9OC | * | 211,380 | 410 | 76 | 184 |
| *UA9DD | * | 189,210 | 295 | 72 | 193 |
| *UA9FGJ | * | 185,555 | 369 | 41 | 144 |
| *UA9FEG | * | 159,355 | 381 | 49 | 154 |
| *UA9OJG | * | 153,912 | 694 | 50 | 109 |
| *RV9CLF | * | 83,937 | 252 | 34 | 113 |
| *UA9OSV | * | 77,714 | 258 | 29 | 93 |
| *UA9LGL | * | 64,666 | 203 | 46 | 103 |
| *RA9FTM | * | 29,694 | 138 | 29 | 72 |
| *UA9XF | * | 21,384 | 100 | 26 | 73 |
| *UA9LAC | * | 10,089 | 77 | 16 | 41 |
| ***UA9YE** | **28** | **138,226** | **536** | **24** | **98** |
| ***RA9FLW** | **"** | **110,922** | **439** | **24** | **90** |
| *UA9OUB | * | 36,240 | 321 | 13 | 47 |
| ***RG9O** | **21** | **343,870** | **1209** | **30** | **107** |
| | | | (Op: RZ9OU) | | |
| *UA9AAP | * | 80,339 | 354 | 24 | 78 |
| *UA9AC | * | 44,360 | 191 | 26 | 85 |
| *UA9OAL | * | 28,756 | 169 | 21 | 58 |
| *UA9QFF | * | 12,218 | 121 | 7 | 34 |
| ***RA9KM** | **14** | **113,772** | **445** | **26** | **88** |
| ***RV9JR** | **"** | **90,117** | **394** | **23** | **70** |
| *RK9JW | * | 78,039 | 358 | 25 | 62 |
| *RU9WZ | * | 49,600 | 295 | 25 | 75 |
| *UA9XAB | * | 37,592 | 186 | 16 | 58 |
| *UA9MP | * | 19,564 | 106 | 24 | 49 |
| *UA9MQR | * | 12,180 | 132 | 13 | 45 |
| ***RK9AWC** | **7** | **233,700** | **788** | **26** | **97** |
| | | | (Op: RZ9AZ) | | |
| *UA9AFO | * | 135,369 | 506 | 26 | 91 |
| *UA9AB | * | 33,174 | 170 | 18 | 72 |
| **UAØACG** | **A** | **821,600** | **1293** | **79** | **237** |
| UAØAZ | * | 357,424 | 573 | 103 | 253 |
| UAØCW | * | 219,186 | 410 | 78 | 165 |
| UAØABB | * | 92,421 | 244 | 62 | 127 |
| **RAØBA** | **21** | **406,140** | **1135** | **35** | **105** |
| **RAØFU** | **7** | **282,070** | **1099** | **34** | **100** |
| UAØBA | * | 15,750 | 146 | 20 | 25 |
| **UAØFDX** | **3.5** | **10,959** | **198** | **18** | **21** |
| ***UAØYAY** | **A** | **237,728** | **394** | **83** | **189** |
| ***UAØONV** | **"** | **137,329** | **411** | **63** | **128** |
| *RUØBW | * | 115,028 | 286 | 44 | 105 |
| *RUØAE | * | 101,528 | 292 | 67 | 129 |
| *UAØSMF | * | 89,040 | 357 | 40 | 100 |
| *UAØFGN | * | 35,464 | 138 | 47 | 57 |
| *RAØZD | * | 32,289 | 92 | 59 | 82 |
| *UAØSBQ | * | 14,396 | 102 | 19 | 42 |
| *UAØFBS | * | 14,136 | 101 | 40 | 53 |
| ***RAØFN** | **28** | **132,808** | **599** | **31** | **73** |
| *RUØBB | * | 82,770 | 391 | 22 | 71 |
| *RWØLIA | * | 28,900 | 158 | 22 | 46 |
| *RAØCL | * | 450 | 33 | 5 | 5 |
| *UAØSR | * | 100 | 95 | 14 | 35 |
| ***UABJQ** | **21** | **418,990** | **1546** | **33** | **110** |
| *RUØUQ | * | 72,240 | 533 | 24 | 56 |
| ***UABSAD** | **14** | **193,117** | **675** | **28** | **85** |
| *RUØAAB | * | 86,814 | 522 | 20 | 58 |
| *RWØBG | 7 | 5,280 | 75 | 17 | 31 |
| *UAØDW | * | 1,278 | 70 | 8 | 10 |
| **ASIATIC TURKEY** | | | | | |
| TA3J | 21 | 988 | 23 | 9 | 17 |
| TA3YJ | 14 | 210 | 8 | 6 | 8 |
| **TA3DD** | **3.5** | **224,250** | **1122** | **12** | **66** |
| ***TA2DA** | **28** | **255,360** | **863** | **25** | **87** |
| *TA3BN | * | 59,616 | 471 | 18 | 51 |
| ***TA3D** | **7** | **661,797** | **1976** | **27** | **100** |
| **BAHRAIN** | | | | | |
| ***A92ZE** | **1.8** | **24,192** | **150** | **15** | **49** |
| | | | (Op: K4SXT) | | |
| **BANGLADESH** | | | | | |
| ***S21YY** | **21** | **38,080** | **355** | **18** | **52** |
| **CHINA** | | | | | |
| ***BD5WW** | **A** | **689,379** | **1616** | **93** | **198** |
| ***BA7NQ** | **21** | **54,391** | **266** | **29** | **80** |
| **CYPRUS** | | | | | |
| **C4W** | **A** | **7,072,123** | **4628** | **137** | **452** |
| | | | (Op: 5B4WN) | | |
| **P3F** | **"** | **5,598,580** | **3415** | **127** | **483** |
| | | | (Op: 5B4AGN) | | |
| **5B4AHA** | **28** | **470,448** | **1503** | **28** | **93** |
| ***H2E** | **A** | **750,235** | **1308** | **54** | **173** |
| | | | (Op: 5B4AGE) | | |
| **GEORGIA** | | | | | |
| **4L8A** | **28** | **817,760** | **2171** | **33** | **119** |
| ***4L2M** | **3.5** | **75,668** | **478** | **11** | **59** |
| **HONG KONG** | | | | | |
| ***VR2BG** | **21** | **713,022** | **2028** | **38** | **113** |
| **INDIA** | | | | | |
| **VU2WAP** | **A** | **5,041,784** | **3347** | **142** | **441** |
| | | | (Op: RA9CO) | | |
| VU2PAI | * | 1,735,968 | 1701 | 105 | 311 |
| ***VU3JDI** | **A** | **608,516** | **955** | **84** | **214** |
| | | | (Op: AD6TF) | | |
| ***VU3BKY** | **28** | **40,890** | **199** | **23** | **71** |
| *VU2JN | * | 7,434 | 66 | 18 | 45 |
| ***VU2UR** | **14** | **24,180** | **140** | **28** | **50** |
| **ISRAEL** | | | | | |
| 4X6ZK | A | 34,265 | 193 | 24 | 53 |
| **4Z5LO** | **3.5** | **22,914** | **201** | **11** | **56** |
| **4X3A** | **1.8** | **126,960** | **528** | **18** | **74** |
| | | | (Op: 4X4NJ) | | |
| ***4X6FR** | **A** | **3,196,665** | **2965** | **93** | **312** |
| *4X4ARC | * | 642,785 | 870 | 88 | 231 |
| | | | (Op: 4Z5MU) | | |
| *4Z5MO | * | 182,840 | 285 | 85 | 195 |
| *4XØX | * | 107,256 | 451 | 38 | 85 |
| | | | (Op: 4Z5AX) | | |
| *4X6UU | * | 74,260 | 209 | 41 | 117 |
| ***4Z8EE** | **7** | **244,174** | **819** | **20** | **87** |
| | | | (Op: OK1EE) | | |
| **JAPAN** | | | | | |
| **JE1CKA** | **A** | **1,800,414** | **1700** | **139** | **294** |
| **JK1OPL** | **"** | **1,090,054** | **944** | **140** | **314** |
| JA1ZKZ | * | 860,132 | 944 | 117 | 247 |
| | | | (Op: JP1JFG) | | |
| JA1QOW | * | 494,784 | 648 | 99 | 189 |
| JA1HP | * | 414,000 | 690 | 75 | 165 |
| JS1PWV | * | 350,244 | 619 | 100 | 182 |
| JF1SEK | * | 336,034 | 569 | 79 | 160 |
| JI1EFP | * | 218,834 | 576 | 59 | 95 |
| JR1LEV | * | 217,738 | 427 | 87 | 148 |
| JA1WPX | * | 171,453 | 338 | 67 | 134 |
| JH1SBE | * | 119,867 | 283 | 73 | 114 |
| JF1PUW | * | 74,112 | 303 | 48 | 48 |
| JA1CSB | * | 57,460 | 164 | 45 | 85 |
| JL1ANP | * | 31,062 | 132 | 42 | 51 |
| 7M4QNP | * | 10,080 | 65 | 28 | 35 |
| **7J1AAI** | **28** | **375,240** | **1289** | **34** | **84** |
| | | | (Op: W1NN) | | |
| **JK1OLT** | **21** | **325,584** | **972** | **35** | **101** |
| JH1AZO | * | 79,623 | 454 | 26 | 55 |
| 7N4KDU | * | 28,743 | 159 | 25 | 55 |
| JO1QZI | * | 26,964 | 177 | 28 | 56 |
| JA1HHU | 14 | 18,544 | 127 | 28 | 48 |
| JK1LUY | * | 336 | 10 | 4 | 8 |
| **JH1AEP** | **7** | **223,524** | **766** | **34** | **92** |
| JA1JKG | * | 110,772 | 470 | 28 | 74 |
| JA1KJW | 3.5 | 3,040 | 47 | 15 | 25 |
| JA1IZZ | * | 966 | 22 | 9 | 12 |
| ***JI1RXQ** | **A** | **1,385,245** | **1404** | **120** | **259** |
| ***JS1OYN** | **"** | **1,022,580** | **1133** | **113** | **229** |
| ***JA1BNW** | **"** | **630,630** | **798** | **106** | **209** |
| *JF3KQA/1 | * | 482,164 | 622 | 103 | 195 |
| *JA1CP | * | 388,808 | 594 | 95 | 167 |
| *JA1XUY | * | 313,560 | 472 | 95 | 165 |
| *JI3KHN/1 | * | 230,374 | 431 | 79 | 150 |
| *JH1SVO | * | 223,728 | 423 | 83 | 154 |
| *JA1JQY | * | 218,631 | 402 | 71 | 132 |
| *JA1XRH | * | 211,500 | 339 | 87 | 163 |
| *JF2OZH/1 | * | 191,292 | 328 | 94 | 134 |
| *JG3NKP/1 | * | 157,688 | 316 | 69 | 115 |
| *JH1MTR | * | 126,540 | 290 | 66 | 105 |
| *JA1XPU | * | 124,806 | 269 | 74 | 112 |
| *JJ1CBY | * | 121,160 | 407 | 45 | 85 |
| *JH1FNU | * | 119,680 | 312 | 52 | 108 |
| *JJ1JGI | * | 119,168 | 273 | 76 | 120 |
| *JA1PS | * | 117,401 | 277 | 75 | 92 |
| *JH1DYV | * | 116,571 | 247 | 72 | 111 |
| *7K4GUR | * | 105,570 | 174 | 81 | 174 |
| *JE1HJV | * | 86,944 | 242 | 60 | 83 |
| *JA1IZ | * | 83,213 | 240 | 64 | 109 |
| *JR1XKU | * | 82,688 | 239 | 47 | 89 |
| *JG1OWV | * | 82,000 | 170 | 88 | 117 |
| *JA1HFY | * | 77,244 | 250 | 63 | 101 |
| *JA1TCF | * | 76,994 | 208 | 58 | 79 |
| *JA1WHG | * | 55,890 | 211 | 76 | 86 |
| *JA1EJD | * | 45,129 | 178 | 62 | 85 |
| *JA1AZS | * | 41,040 | 165 | 55 | 80 |
| *JA1HG | * | 40,920 | 159 | 49 | 61 |
| *JP1SRG | * | 28,413 | 118 | 45 | 54 |
| *JM1KNI | * | 28,036 | 131 | 35 | 51 |
| *JR7HOO/1 | * | 25,020 | 112 | 21 | 69 |
| *JH1PXY | * | 13,861 | 94 | 38 | 45 |
| *JH1NXU | * | 11,376 | 76 | 31 | 41 |
| *7L4SCQ/1 | * | 11,040 | 90 | 40 | 52 |
| *JA1BCP | * | 10,320 | 94 | 32 | 48 |
| *JA1BFN | * | 9,592 | 93 | 18 | 26 |
| *JE1UKM | * | 9,516 | 63 | 27 | 25 |
| *JA1SJR | * | 5,700 | 45 | 26 | 34 |
| *JA1GYO | * | 2,223 | 21 | 19 | 20 |
| *JA1IE | * | 1,242 | 24 | 9 | 14 |
| ***JA1NLX** | **28** | **119,260** | **521** | **28** | **61** |
| ***JHØSDA/1** | **"** | **102,021** | **451** | **31** | **62** |
| *JA1LZR | * | 93,873 | 496 | 25 | 58 |
| *JI1HFJ | * | 71,878 | 346 | 25 | 58 |
| *JA1BUI | * | 63,008 | 294 | 29 | 59 |
| *JH1TXG | * | 52,510 | 240 | 27 | 62 |
| *JK1AFI | * | 20,536 | 137 | 23 | 45 |
| *JA1VVH | * | 19,312 | 130 | 21 | 47 |
| *JA1EMQ | * | 16,320 | 115 | 21 | 47 |
| *JJ1LRD | * | 14,896 | 125 | 20 | 29 |
| *JA1GS | * | 7,215 | 80 | 16 | 23 |
| *7K2PBB | * | 2,187 | 29 | 12 | 15 |
| *JH1TUX | * | 1,472 | 25 | 10 | 13 |
| ***7M1MCT** | **21** | **204,360** | **588** | **33** | **98** |
| ***7K4XNN** | **"** | **181,151** | **673** | **31** | **76** |
| *JI1ALP | * | 154,581 | 492 | 34 | 85 |
| *JE1RRK | * | 87,138 | 357 | 31 | 72 |
| *JO1WIZ | * | 19,320 | 121 | 23 | 47 |
| *JE1JAC | * | 14,490 | 109 | 21 | 42 |
| *JH1OLB | * | 12,540 | 105 | 20 | 35 |
| *JJ1VGA | * | 1,944 | 33 | 16 | 20 |
| *JH1FSF | 14 | 19,314 | 103 | 24 | 50 |
| ***JA1KVT** | **7** | **66,096** | **255** | **31** | **77** |
| *JH1APZ | * | 32,900 | 167 | 30 | 64 |
| *JA1BXV | * | 374 | 14 | 8 | 9 |
| *JA1AAT | * | 100 | 21 | 7 | 16 |
| ***JR1DIU** | **1.8** | **8,946** | **76** | **32** | **39** |
| *JE1SPY | * | 465 | 27 | 7 | 8 |
| *JE1TSD | * | 270 | 11 | 8 | 7 |
| **JA2ZJW** | **A** | **2,167,640** | **1876** | **144** | **326** |
| **JH2BCN** | **"** | **1,357,494** | **1478** | **120** | **246** |
| JA2JTN | * | 344,004 | 613 | 78 | 140 |
| JA2QVP | * | 106,330 | 254 | 60 | 95 |
| JA2BQX | * | 68,244 | 238 | 50 | 82 |
| JA2FSM | * | 53,960 | 154 | 59 | 93 |
| JF2VUF | * | 144 | 6 | 4 | 4 |
| **JF2ION** | **28** | **178,770** | **661** | **35** | **83** |
| **JA2QXP** | **21** | **165,920** | **573** | **31** | **91** |
| **JE2HVC** | **7** | **59,040** | **246** | **25** | **71** |
| JF2BDK | 3.5 | 3,808 | 52 | 14 | 20 |
| JM1OZP/2 | * | 391 | 13 | 8 | 9 |
| **JH2FXK** | **1.8** | **884** | **32** | **13** | **13** |
| ***JH2NWP** | **A** | **1,074,876** | **1165** | **116** | **258** |
| ***JA2CUS** | **"** | **458,640** | **646** | **96** | **198** |
| *JA2VZL | * | 377,784 | 580 | 90 | 174 |
| *JA2BY | * | 311,736 | 515 | 88 | 160 |
| *JF2QNM | * | 109,189 | 338 | 63 | 74 |
| *JO2EHD | * | 87,552 | 230 | 70 | 101 |
| *JO2SLZ | * | 71,765 | 188 | 65 | 90 |
| *JA2UJ | * | 52,015 | 208 | 41 | 62 |
| *JA2KPW | * | 44,982 | 150 | 47 | 72 |
| *JA2KCY | * | 18,942 | 94 | 33 | 49 |
| *JA2MZ | * | 16,281 | 106 | 31 | 50 |
| *JH2OMM | * | 13,806 | 73 | 28 | 50 |
| *JI2VLM | * | 2,530 | 28 | 23 | 23 |
| ***JA2IU** | **28** | **119,890** | **513** | **29** | **66** |
| *JG2TKH | * | 27,216 | 164 | 22 | 41 |
| *JQ1AHZ/2 | 21 | 7,098 | 78 | 17 | 25 |
| *JA2EAB | * | 527 | 26 | 12 | 19 |
| *JA2KKA | 14 | 11,400 | 108 | 12 | 28 |
| *JE2OTM | 1.8 | 64 | 5 | 4 | 4 |
| **JF3CCN** | **A** | **875,140** | **976** | **117** | **263** |
| JR3KQJ | * | 310,050 | 533 | 88 | 146 |
| JR3XEX | * | 21,201 | 133 | 44 | 67 |
| **JA3XOG** | **28** | **110,876** | **413** | **32** | **74** |
| **JH3AIU** | **21** | **666,288** | **1701** | **35** | **109** |
| JR3NZC | * | 479,556 | 1321 | 35 | 119 |
| JL3SBE | 7 | 12,480 | 95 | 21 | 44 |
| JK3DGX | 3.5 | 5,940 | 65 | 16 | 28 |
| ***JE6EKC/3** | **A** | **496,888** | **781** | **90** | **176** |
| ***JG3LGD** | **"** | **475,495** | **628** | **97** | **208** |
| ***JA1RKI/3** | **"** | **448,817** | **629** | **92** | **197** |
| *JA3MVI | * | 414,864 | 607 | 97 | 171 |
| *JE3WVA | * | 222,420 | 394 | 73 | 147 |
| *JH3CUL | * | 186,282 | 353 | 82 | 155 |
| *JA4XHF/3 | * | 177,100 | 308 | 78 | 142 |
| *JA3UWB | * | 149,592 | 330 | 71 | 113 |
| *JJ1BDX/3 | * | 121,976 | 307 | 61 | 97 |
| *JH3JYS | * | 81,184 | 199 | 69 | 103 |
| *JR3NDM | * | 79,588 | 246 | 74 | 123 |
| *JA3DAY | * | 65,637 | 184 | 54 | 89 |
| *JA3HC | * | 43,018 | 156 | 51 | 86 |
| *JF3IPR | * | 30,240 | 116 | 50 | 70 |
| *JA3BCT | * | 16,170 | 93 | 41 | 57 |
| ***JF3BFS** | **28** | **211,014** | **731** | **32** | **82** |
| *JG1EIQ/3 | * | 43,280 | 211 | 24 | 56 |
| *JN3DSH | * | 35,784 | 209 | 23 | 48 |
| ***JR3EOI** | **21** | **272,740** | **813** | **33** | **97** |
| *JK3GWT | * | 220,780 | 640 | 33 | 100 |
| *JF3IYW | * | 1,692 | 28 | 14 | 22 |
| *JK3AHS | * | 100 | 19 | 12 | 15 |
| *JA3LKE | 14 | 27,300 | 157 | 27 | 51 |
| *JG3DOR | 7 | 297 | 11 | 5 | 6 |
| *JE2XBS/3 | * | 260 | 10 | 6 | 7 |
| **JA4YHX** | **A** | **106,764** | **229** | **77** | **109** |
| | | | (Op: JA4CZM) | | |
| JA4AOZ | 21 | 14,839 | 127 | 24 | 47 |
| ***JH4UYB** | **A** | **2,842,317** | **1989** | **159** | **370** |
| *JE4MHL | * | 282,194 | 431 | 93 | 161 |
| *JA4CES | * | 43,561 | 157 | 44 | 83 |
| *JI4RDO | * | 4,410 | 53 | 14 | 21 |
| ***JR4GPA** | **28** | **100,400** | **476** | **25** | **55** |
| *JA4ETH | * | 41,580 | 254 | 26 | 58 |
| *JA4AQR | * | 37,062 | 200 | 22 | 49 |
| *JM4WUZ | * | 9,165 | 69 | 17 | 30 |
| *JJ4CDW | 7 | 1,984 | 24 | 11 | 21 |
| **JH5FXP** | **A** | **4,718,450** | **3215** | **163** | **387** |
| **JA5DQH** | **"** | **4,469,712** | **3011** | **155** | **396** |
| JA5IP | * | 146,692 | 310 | 78 | 139 |
| **J

| | | | | | |
|---|---|---|---|---|---|
| JRØOKR | * | 19,796 | 86 | 35 | 65 |
| **JHØFUW** | **28** | **272,552** | **843** | **34** | **90** |
| ***JAØBMS** | **A** | **233,247** | **461** | **75** | **127** |
| ***JHØGHZ** | **"** | **184,240** | **305** | **98** | **147** |
| *JAØXZD | * | 134,693 | 314 | 62 | 107 |
| *JJØFVP | * | 133,380 | 293 | 69 | 111 |
| *JEØUXR | * | 62,609 | 217 | 47 | 90 |
| *JHØIXE | * | 51,183 | 167 | 47 | 74 |
| *JAØBJY | * | 31,400 | 129 | 37 | 63 |
| *JIØNXA | * | 27,379 | 150 | 54 | 77 |
| *JHØSGG | * | 16,766 | 90 | 45 | 56 |
| *JAØRCK | * | 13,530 | 59 | 31 | 51 |
| *JGØAXT | * | 8,532 | 64 | 25 | 29 |
| **JHØNVX** | **28** | **101,234** | **410** | **31** | **67** |
| **JHØNEC** | **21** | **197,094** | **770** | **29** | **78** |
| **JHØEPI** | **14** | **138,990** | **473** | **29** | **84** |
| *JAØGEY | 7 | 3,100 | 47 | 12 | 19 |
| *JAØDOW | * | 858 | 27 | 10 | 12 |
| *JAØGZ | 3.5 | 1,080 | 23 | 9 | 11 |

**JORDAN**

| | | | | | |
|---|---|---|---|---|---|
| **JY9NX** | **14** | **1,085,166** | **2450** | **39** | **128** |
| | | | **(Op: JM1CAX)** | | |

**KAZAKHSTAN**

| | | | | | |
|---|---|---|---|---|---|
| **UN7QX** | **A** | **2,025,040** | **2331** | **84** | **256** |
| **UN6T** | **"** | **1,780,382** | **1598** | **114** | **347** |
| **UPØL** | **28** | **341,562** | **1023** | **30** | **121** |
| | | | **(Op: UN9LW)** | | |
| **UN9LY** | **21** | **339,742** | **1157** | **33** | **113** |
| UN7JJ | * | 270,412 | 1149 | 31 | 103 |
| **UN4L** | **7** | **518,457** | **1633** | **31** | **110** |
| | | | **(Op: RN9AO)** | | |
| UN7TS | * | 11,514 | 106 | 12 | 45 |
| **UN7CW** | **3.5** | **303,831** | **1128** | **28** | **93** |
| ***UP6P** | **A** | **1,346,274** | **1357** | **118** | **348** |
| | | | **(Op: UN6P)** | | |
| ***UN4PG** | **"** | **973,504** | **1066** | **89** | **282** |
| *UN7JX | * | 844,872 | 1198 | 98 | 278 |
| ***UN5J** | **28** | **416,770** | **1398** | **29** | **113** |
| *UN7EX | * | 45,159 | 189 | 26 | 87 |
| ***UN8FM** | **21** | **8,721** | **68** | **13** | **38** |
| ***UN9LN** | **14** | **306,056** | **983** | **31** | **103** |
| *UN4PD | * | 163,185 | 563 | 29 | 86 |
| *UN8FZ | 7 | 2,370 | 35 | 8 | 22 |

**KOREA**

| | | | | | |
|---|---|---|---|---|---|
| DSØDX | 28 | 3,120 | 75 | 10 | 10 |
| | | | (Op: HL1XP) | | |
| **HL5UOG** | **21** | **100,776** | **411** | **30** | **72** |
| **HL1XP** | **7** | **100,192** | **528** | **31** | **70** |
| **HL3AMO** | **3.5** | **2,331** | **58** | **15** | **22** |
| ***HL2FDW** | **A** | **417,162** | **890** | **80** | **171** |
| ***HL1/WX8C** | **"** | **376,623** | **614** | **84** | **177** |
| *HL1EJT | * | 298,540 | 728 | 84 | 152 |
| *HL3AHQ | * | 7,776 | 61 | 29 | 43 |

**KYRGYZSTAN**

| | | | | | |
|---|---|---|---|---|---|
| **EX2A** | **A** | **2,257,200** | **2224** | **97** | **335** |
| EX8O | * | 408,800 | 640 | 93 | 272 |
| **EX2X** | **14** | **369,012** | **1103** | **33** | **105** |
| ***EX2M** | **28** | **57,353** | **391** | **21** | **62** |

**LAOS**

| | | | | | |
|---|---|---|---|---|---|
| ***XW1IC** | **A** | **2,809,180** | **2963** | **122** | **330** |
| | | | **(Op: E21EIC)** | | |

**MONGOLIA**

| | | | | | |
|---|---|---|---|---|---|
| **JT1CO** | **A** | **4,395,888** | **3997** | **144** | **390** |
| ***JT1FHD** | **14** | **193,874** | **857** | **29** | **89** |

**OMAN**

| | | | | | |
|---|---|---|---|---|---|
| **A45XR** | **A** | **9,300,480** | **5092** | **155** | **517** |

**SAUDI ARABIA**

| | | | | | |
|---|---|---|---|---|---|
| **HZ1AB** | **21** | **718,580** | **1888** | **35** | **120** |
| | | | **(Op: SMØCXU)** | | |

**SINGAPORE**

| | | | | | |
|---|---|---|---|---|---|
| **9V1YC** | **21** | **708,708** | **2082** | **36** | **120** |

**TAIWAN**

| | | | | | |
|---|---|---|---|---|---|
| **BV7FF** | **28** | **124,280** | **696** | **30** | **74** |
| ***BV4YI** | **A** | **1,552,848** | **1967** | **119** | **289** |
| | | | **(Op: UA3VCS)** | | |
| ***BV3BW** | **21** | **81,720** | **587** | **26** | **64** |

**TAJIKISTAN**

| | | | | | |
|---|---|---|---|---|---|
| **EY8MM** | **28** | **520,650** | **1495** | **32** | **118** |
| ***EY7AB** | **21** | **124,444** | **556** | **22** | **84** |
| ***EY8CQ** | **14** | **150,192** | **547** | **29** | **83** |

**THAILAND**

| | | | | | |
|---|---|---|---|---|---|
| **HSØZDZ** | **A** | **1,604,597** | **1676** | **124** | **347** |
| | | | **(Op: G3NOM)** | | |
| **HSØZDY** | **21** | **28,704** | **193** | **27** | **77** |
| ***E2ØHHK** | **A** | **381,160** | **865** | **71** | **189** |
| *HS4BPQ/9 | * | 115,068 | 282 | 68 | 155 |
| *HSØ/OZ1HET | * | 73,372 | 258 | 54 | 112 |

**UK BASES ON CYPRUS**

| | | | | | |
|---|---|---|---|---|---|
| **ZC4DW** | **3.5** | **154,734** | **700** | **14** | **68** |
| ***ZC4VG** | **21** | **98,550** | **528** | **14** | **59** |
| | | | **(Op: GØUVX)** | | |

**UZBEKISTAN**

| | | | | | |
|---|---|---|---|---|---|
| **UK9AA** | **21** | **723,720** | **1866** | **36** | **127** |

**VIETNAM**

| | | | | | |
|---|---|---|---|---|---|
| **XV9DT** | **A** | **651,360** | **1102** | **84** | **211** |
| ***3W2LWS** | **A** | **182,952** | **496** | **75** | **123** |
| | | | **(Op: WA1LWS)** | | |
| *3W2FM | * | 136,068 | 562 | 71 | 133 |

**WEST MALAYSIA**

| | | | | | |
|---|---|---|---|---|---|
| ***9M2TO** | **A** | **921,930** | **1844** | **108** | **281** |
| ***9M2/G4ZFE** | **21** | **32,490** | **174** | **30** | **60** |

## EUROPE

**4U-GENEVA**

| | | | | | |
|---|---|---|---|---|---|
| **4U1ITU** | **A** | **3,545,226** | **3827** | **113** | **421** |
| | | | **(Op: K1ZZ)** | | |

**4U-VIENNA**

| | | | | | |
|---|---|---|---|---|---|
| **4U1VIC** | **21** | **516,768** | **1637** | **33** | **135** |
| | | | **(Op: JH4RHF)** | | |

**ALAND ISLANDS**

| | | | | | |
|---|---|---|---|---|---|
| **OHØV** | **21** | **697,218** | **1970** | **36** | **138** |
| | | | **(Op: OH6LI)** | | |

| | | | | | |
|---|---|---|---|---|---|
| **OHØZ** | **14** | **833,360** | **2575** | **38** | **138** |
| | | | **(Op: OH2MA)** | | |
| **OHØNL** | **7** | **864,468** | **2672** | **38** | **139** |
| | | | **(Op: OH2BYS)** | | |

**ALBANIA**

| | | | | | |
|---|---|---|---|---|---|
| **ZA/Z35M** | **A** | **318,528** | **938** | **58** | **179** |
| *ZA/OH5BM | A | 10 | 4 | 4 | 4 |

**AUSTRIA**

| | | | | | |
|---|---|---|---|---|---|
| **OE2BZL** | **A** | **1,835,713** | **2224** | **105** | **368** |
| **OE3GSA** | **28** | **182,856** | **572** | **33** | **119** |
| **OE5CWL** | **21** | **272,783** | **1176** | **29** | **104** |
| **OE2LCM** | **3.5** | **145,629** | **1167** | **18** | **81** |
| ***OE6VIE** | **A** | **435,596** | **942** | **77** | **252** |
| *OE5CYL | * | 113,454 | 376 | 48 | 143 |
| *OE1JIS | * | 270 | 105 | 25 | 65 |

**AZORES**

| | | | | | |
|---|---|---|---|---|---|
| **CU/DJ9RR** | **A** | **2,611,290** | **2918** | **106** | **345** |

**BALEARIC ISLANDS**

| | | | | | |
|---|---|---|---|---|---|
| ***EA6DD** | **A** | **557,550** | **850** | **88** | **290** |
| *EA6NB | * | 210,308 | 731 | 50 | 146 |
| *EA6GP | * | 78,084 | 386 | 43 | 119 |
| ***EA6/DL8NBY** | **7** | **117,165** | **693** | **29** | **87** |

**BELARUS**

| | | | | | |
|---|---|---|---|---|---|
| **EU1SA** | **A** | **1,114,080** | **1249** | **117** | **363** |
| EW3LN | * | 140,490 | 470 | 54 | 169 |
| **EU4AA** | **28** | **330,497** | **1101** | **34** | **128** |
| **EU1DX** | **21** | **483,144** | **1420** | **32** | **132** |
| **EW8EW** | **14** | **483,288** | **1903** | **35** | **121** |
| EW6GF | * | 70,473 | 812 | 23 | 65 |
| **EU1UN** | **3.5** | **182,965** | **1329** | **22** | **93** |
| EU6DX | * | 38,142 | 435 | 13 | 65 |
| EU7ZZ | * | 29,795 | 484 | 12 | 47 |
| | | | (Op: EW7KR) | | |
| EW8OU | * | 17,340 | 219 | 10 | 58 |
| **EU6EU** | **1.8** | **74,128** | **891** | **15** | **67** |
| ***EW1CQ** | **A** | **699,696** | **1228** | **88** | **299** |
| *EU1MM | * | 152,736 | 347 | 67 | 191 |
| *EU4LY | * | 127,553 | 500 | 52 | 177 |
| *EU1CC | * | 123,900 | 422 | 53 | 183 |
| *EW8OS | * | 93,000 | 255 | 65 | 183 |
| *EW1EA | * | 8,184 | 70 | 18 | 48 |
| ***EW2AA** | **28** | **200,320** | **547** | **34** | **126** |
| *EV6M | * | 13,802 | 143 | 16 | 51 |
| ***EW6MM** | **21** | **33,792** | **193** | **23** | **73** |
| ***EU2MM** | **14** | **73,482** | **411** | **26** | **85** |
| ***EW6AL** | **7** | **64,182** | **394** | **23** | **91** |

**BELGIUM**

| | | | | | |
|---|---|---|---|---|---|
| **ON7GB** | **A** | **890,824** | **1340** | **97** | **285** |
| **ON4ATW** | **3.5** | **180,264** | **1078** | **22** | **94** |
| ON4BR | * | 25,696 | 292 | 15 | 73 |
| **ON4UN** | **1.8** | **107,160** | **1035** | **14** | **80** |
| ***ON4CCP** | **A** | **1,012,684** | **1497** | **88** | **321** |
| ***ON4CAS** | **"** | **970,200** | **1192** | **93** | **347** |
| *ON4XG | * | 353,510 | 617 | 67 | 223 |
| *ON4AAM | * | 215,488 | 551 | 57 | 151 |
| *ON5HY | * | 119,184 | 401 | 53 | 155 |
| *ON6LY | * | 75,862 | 289 | 49 | 117 |
| *ON6WP | * | 58,380 | 308 | 36 | 104 |
| *ON5ZO | * | 20,608 | 109 | 29 | 63 |
| *ON4KVA | * | 11,330 | 104 | 18 | 37 |
| ***ON6TJ** | **28** | **40,170** | **219** | **22** | **56** |
| *ON4LDP | * | 18,411 | 161 | 18 | 33 |
| ***ON6CW** | **21** | **88,160** | **423** | **26** | **90** |
| ***ON4ADZ** | **1.8** | **2,332** | **86** | **6** | **38** |

**BOSNIA-HERZEGOVINA**

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|---|---|---|---|---|---|
| **T94OL** | **3.5** | **68,856** | **851** | **12** | **64** |
| T94MZ | * | 13,083 | 275 | 6 | 43 |
| ***T95A** | **A** | **1,282,740** | **1672** | **104** | **380** |
| *T93Y | * | 841,428 | 1088 | 85 | 286 |
| ***T94FC** | **28** | **264,040** | **903** | **30** | **110** |

**BULGARIA**

| | | | | | |
|---|---|---|---|---|---|
| **LZ9X** | **28** | **402,384** | **1216** | **35** | **131** |
| | | | **(Op: LZ1RW)** | | |
| LZ1NG | * | 335,331 | 1251 | 35 | 124 |
| LZ1QN | * | 191,264 | 715 | 31 | 108 |
| LZ9V | * | 65,946 | 503 | 24 | 63 |
| **LZ2RF** | **3.5** | **40,888** | **486** | **13** | **63** |
| LZ1QZ | * | 11,396 | 270 | 7 | 37 |
| ***LZ2BE** | **A** | **1,563,747** | **1940** | **115** | **404** |
| *LZ5ZI | * | 331,837 | 662 | 72 | 239 |
| *LZ3NY | * | 295,680 | 535 | 71 | 237 |
| *LZ1RW | * | 250,482 | 517 | 76 | 251 |
| *LZ2AH | * | 245,364 | 611 | 68 | 186 |
| *LZ2UZ | * | 120,540 | 646 | 42 | 163 |
| *LZ1GU | * | 82,611 | 161 | 63 | 138 |
| *LZ1QH | * | 81,263 | 241 | 64 | 156 |
| *LZ1FJ | * | 78,384 | 322 | 43 | 141 |
| *LZ4BU | * | 21,420 | 101 | 38 | 64 |
| *LZ1NJ | * | 10,863 | 92 | 20 | 51 |
| ***LZ2JA** | **28** | **178,200** | **692** | **32** | **100** |
| *LZ3DP | * | 37,916 | 225 | 25 | 64 |
| *LZ1EP | * | 33,669 | 248 | 24 | 63 |
| *LZ2SX | * | 10,387 | 94 | 19 | 28 |
| *LZ2CM | * | 1,250 | 26 | 11 | 14 |
| ***LZ1CW** | **21** | **136,485** | **527** | **31** | **104** |
| ***LZ2L** | **"** | **130,662** | **619** | **26** | **96** |
| | | | **(Op: LZ2LDS)** | | |
| *LZ2PB | * | 88,011 | 410 | 31 | 96 |
| *LZ1CF | * | 49,435 | 330 | 35 | 117 |
| ***LZ2TU** | **14** | **258,292** | **1499** | **32** | **92** |
| ***LZ6W** | **"** | **234,675** | **925** | **31** | **118** |
| | | | **(Op: LZ4ZP)** | | |
| *LZ3UA | * | 151,036 | 894 | 25 | 97 |
| *LZ1KNZ | * | 4,256 | 62 | 11 | 27 |
| | | | (Op: LZ1NE) | | |
| *LZ2VP | * | 1,072 | 26 | 8 | 8 |
| ***LZ3PZ** | **7** | **54,708** | **442** | **19** | **75** |
| *LZ2JF | * | 46,736 | 345 | 21 | 71 |

**CRETE**

| | | | | | |
|---|---|---|---|---|---|
| ***SV9/LA4XFA** | **28** | **46,179** | **546** | **18** | **45** |

**CORSICA**

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|---|---|---|---|---|---|
| **TK5EP** | **A** | **2,709,720** | **3028** | **110** | **358** |

**CROATIA**

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|---|---|---|---|---|---|
| **9A2VR** | **A** | **1,229,787** | **1660** | **104** | **353** |
| **9A3IQ** | **7** | **241,180** | **1673** | **34** | **121** |
| **9A1CCY** | **3.5** | **214,049** | **1401** | **20** | **101** |
| | | | **(Op: 9A5AGL)** | | |
| 9A1P | * | 148,830 | 1098 | 19 | 91 |
| **9A2AJ** | **1.8** | **69,179** | **784** | **20** | **72** |
| ***9A2RD** | **A** | **1,875,984** | **2128** | **113** | **415** |
| *9A7DM | * | 406,112 | 631 | 92 | 251 |
| *9AØR | * | 77,571 | 232 | 52 | 117 |
| | | | (Op: 9A9R) | | |
| *9A3ST | * | 15,921 | 114 | 30 | 57 |
| ***9A3VM** | **28** | **332,780** | **1157** | **32** | **108** |
| *9A3CY | * | 16,005 | 114 | 19 | 36 |
| ***9A1KMT** | **14** | **71,613** | **481** | **23** | **86** |
| ***9A7T** | **7** | **163,357** | **972** | **27** | **104** |
| ***9A4X** | **1.8** | **38,961** | **520** | **12** | **69** |
| *9A2TN | * | 22,770 | 342 | 8 | 58 |
| *9A2KD | * | 8,580 | 217 | 8 | 44 |

**CZECH REPUBLIC**

| | | | | | |
|---|---|---|---|---|---|
| **OK1RF** | **A** | **4,013,569** | **2905** | **152** | **527** |
| **OK1EP** | **"** | **2,024,176** | **2009** | **123** | **460** |
| **OK1AVY** | **"** | **1,963,703** | **2071** | **112** | **441** |
| OK2PDT | * | 1,480,518 | 1685 | 105 | 376 |
| OL4M | * | 969,732 | 1437 | 99 | 339 |
| | | | (Op: OK1ARN) | | |
| OK1AXB | * | 935,617 | 1350 | 99 | 338 |
| OK2ABU | * | 770,028 | 1124 | 90 | 322 |
| OK1AYY | * | 741,117 | 994 | 88 | 315 |
| OK1IBP | * | 468,707 | 793 | 82 | 267 |
| OK1FTW | * | 338,168 | 495 | 85 | 243 |
| OK1ZF | * | 222,154 | 491 | 67 | 210 |
| OK1DXW | * | 208,896 | 470 | 59 | 213 |
| OK1DXR | * | 184,212 | 401 | 65 | 173 |
| OK2PZ | * | 145,740 | 458 | 46 | 164 |
| OK1EV | * | 92,160 | 355 | 56 | 124 |
| OK1AKF | * | 6,003 | 152 | 30 | 57 |
| **OK1FZM** | **28** | **244,922** | **655** | **34** | **117** |
| **OK1AU** | **"** | **218,198** | **638** | **33** | **125** |
| OK1DZR | * | 99,244 | 706 | 23 | 63 |
| **OK1DTP** | **21** | **428,689** | **1262** | **34** | **133** |
| OK1DUT | * | 123,987 | 524 | 27 | 84 |
| **OK1TA** | **7** | **293,563** | **1183** | **33** | **130** |
| **OK1XC** | **"** | **169,058** | **933** | **30** | **107** |
| **OLØE** | **3.5** | **160,655** | **1190** | **22** | **93** |
| | | | **(Op: OK2ZU)** | | |
| OK1FPS | * | 77,952 | 791 | 14 | 70 |
| OK1FOG | * | 33,675 | 410 | 13 | 62 |
| OK1SI | * | 29,920 | 438 | 9 | 59 |
| OK2BZM | * | 16,587 | 266 | 9 | 48 |
| OK2AB | * | 3,321 | 101 | 9 | 32 |
| OK2HWP | * | 3,240 | 112 | 5 | 31 |
| **OK1TP** | **1.8** | **26,092** | **283** | **10** | **62** |
| OK1DWJ | * | 7,770 | 73 | 8 | 62 |
| ***OK2PP** | **A** | **2,541,250** | **2457** | **129** | **496** |
| ***OK2ZV** | **"** | **1,861,860** | **1879** | **117** | **455** |
| ***OK1DOL** | **"** | **1,599,612** | **1632** | **109** | **439** |
| ***OK1JOC** | **"** | **1,541,436** | **1697** | **114** | **419** |
| *OK1HX | * | 1,356,705 | 1520 | 102 | 429 |
| *OK2BGK | * | 1,326,528 | 1551 | 107 | 397 |
| *OK1ZP | * | 1,249,710 | 1657 | 90 | 372 |
| *OK2QX | * | 999,804 | 1243 | 106 | 387 |
| *OK2HBR | * | 925,056 | 1345 | 91 | 305 |
| *OK2MBP | * | 902,820 | 1392 | 80 | 330 |
| *OK2DU | * | 899,066 | 1338 | 97 | 334 |
| *OK2LW | * | 856,530 | 1114 | 102 | 363 |
| *OK2TBC | * | 708,295 | 977 | 100 | 313 |
| *OK2EC | * | 667,913 | 1033 | 87 | 302 |
| *OK2BNX | * | 617,345 | 842 | 93 | 262 |
| *OK2HI | * | 593,198 | 1016 | 98 | 317 |
| *OK1VBA | * | 551,216 | 869 | 90 | 286 |
| *OK7AZ | * | 529,090 | 964 | 72 | 242 |
| | | | (Op: OK2ON) | | |
| *OK2SGY | * | 468,365 | 772 | 87 | 244 |
| *OK2BND | * | 453,474 | 807 | 71 | 283 |
| *OK1AOV | * | 438,565 | 724 | 90 | 277 |
| *OK2TCW | * | 350,640 | 709 | 56 | 184 |
| *OK1FRO | * | 332,618 | 866 | 69 | 217 |
| *OK1BA | * | 313,404 | 554 | 75 | 212 |
| *OK2BJ | * | 262,216 | 448 | 83 | 209 |
| *OK1DTC | * | 260,470 | 453 | 79 | 226 |
| *OK2KJ | * | 251,784 | 550 | 72 | 197 |
| *OK1HGM | * | 222,224 | 503 | 75 | 197 |
| *OK1FKV | * | 212,014 | 598 | 50 | 203 |
| *OK1BMW | * | 198,961 | 360 | 72 | 229 |
| *OK2BPL | * | 184,345 | 423 | 55 | 174 |
| *OK2BLD | * | 178,308 | 406 | 57 | 177 |
| *OK2BRV | * | 144,720 | 463 | 57 | 183 |
| *OK1AOU | * | 141,588 | 413 | 61 | 167 |
| *OK2SWD | * | 124,845 | 361 | 48 | 155 |
| *OK1FCA | * | 122,430 | 394 | 51 | 159 |
| *OK2VX | * | 116,820 | 328 | 55 | 143 |
| *OK2HIJ | * | 115,568 | 241 | 69 | 164 |
| *OK1FJD | * | 115,368 | 365 | 57 | 152 |
| *OK1DKO | * | 104,400 | 293 | 35 | 145 |
| *OK2PBG | * | 98,948 | 303 | 51 | 154 |
| *OK2BNC | * | 89,749 | 261 | 55 | 144 |
| *OK2BDF | * | 86,996 | 252 | 48 | 134 |
| *OK1MZD | * | 78,011 | 245 | 49 | 132 |
| *OK1DVK | * | 57,670 | 166 | 59 | 99 |
| *OK1FFH | * | 53,339 | 277 | 40 | 103 |
| *OK2SG | * | 35,640 | 152 | 38 | 70 |
| *OK1SRD | * | 26,640 | 162 | 41 | 103 |
| *OK1MGW | * | 12,367 | 63 | 39 | 44 |
| *OK1VVW | * | 12,168 | 100 | 26 | 52 |
| *OK2PB | * | 9,563 | 51 | 30 | 43 |
| *OK1DXD | * | 9,506 | 92 | 39 | 59 |
| *OK1TRM | * | 3,712 | 79 | 23 | 41 |
| ***OK1FHL** | **28** | **140,946** | **472** | **33** | **106** |
| ***OK2PTZ** | **"** | **113,832** | **424** | **30** | **94** |
| *OK1ES | * | 99,035 | 350 | 33 | 112 |
| *OK1AUC | * | 80,990 | 339 | 32 | 98 |
| *OK1AES | * | 76,752 | 276 | 27 | 90 |
| *OK2FB | * | 43,706 | 249 | 20 | 62 |
| *OK1DJS | * | 15,540 | 143 | 17 | 57 |
| *OK2NA | * | 13,338 | 134 | 18 | 39 |
| ***OK2NN** | **21** | **266,546** | **802** | **32** | **125** |
| ***OK8ANM** | **"** | **252,487** | **850** | **35** | **128** |
| *OK2WH | * | 100,269 | 513 | 26 | 91 |
| *OK1MMN | * | 49,920 | 295 | 19 | 61 |
| *OK2BEM | * | 46,100 | 247 | 25 | 75 |
| *OK1ABF | * | 40,698 | 176 | 27 | 75 |
| ***OK1DSA** | **14** | **92,920** | **531** | **27** | **88** |
| ***OK1GI** | **"** | **88,236** | **589** | **28** | **86** |
| *OK1GS | * | 72,144 | 433 | 23 | 85 |
| *OK2BWC | * | 8,791 | 148 | 13 | 46 |
| *OK1ARO | * | 2,360 | 49 | 8 | 32 |
| *OK2UQ | * | 15 | 8 | 3 | 2 |
| ***OK1DCF** | **7** | **148,224** | **820** | **26** | **102** |
| ***OL3Y** | **"** | **57,672** | **607** | **15** | **74** |
| | | | **(Op: OK1CRM)** | | |
| *OK1TGI | * | 30,525 | 340 | 14 | 61 |
| ***OK1YO** | **1.8** | **18,005** | **266** | **8** | **57** |
| *OK1JOK | * | 9,130 | 236 | 7 | 48 |

**DENMARK**

| | | | | | |
|---|---|---|---|---|---|
| **OZ1AA** | **A** | **3,298,778** | **3073** | **129** | **445** |
| **OZ1LO** | **"** | **3,091,377** | **3074** | **127** | **442** |
| **OZ4O** | **1.8** | **37,310** | **542** | **7** | **58** |
| ***OZ5UR** | **A** | **365,300** | **657** | **71** | **254** |
| ***OZ4RT** | **"** | **211,470** | **544** | **62** | **204** |
| *OZ4FF | * | 194,928 | 446 | 57 | 191 |
| *OZØRS | * | 118,206 | 333 | 50 | 148 |
| *OZ8SW | * | 91,744 | 254 | 50 | 138 |
| *OZ5DX | * | 26,832 | 200 | 20 | 58 |
| *OZ6EI | * | 24,024 | 158 | 33 | 71 |
| *OZ7AEI | * | 6,840 | 97 | 26 | 64 |
| *OZ5RM | * | 2,065 | 44 | 9 | 26 |
| *OZ5CP | * | 1,360 | 22 | 18 | 22 |
| ***OZ1BMA** | **14** | **64,272** | **408** | **21** | **83** |

**DODECANESE**

| | | | | | |
|---|---|---|---|---|---|
| **SV5/SV1DKL** | **3.5** | **7,590** | **168** | **8** | **38** |
| ***J45KLN** | **A** | **635,320** | **1596** | **60** | **220** |
| | | | **(Op: SMØCMH)** | | |
| ***SV5RDS** | **14** | **141,642** | **948** | **28** | **94** |

**ENGLAND**

| | | | | | |
|---|---|---|---|---|---|
| **G4BUO** | **A** | **4,837,520** | **3321** | **146** | **534** |
| **G3TXF** | **"** | **4,071,897** | **3222** | **129** | **492** |
| G4IIY | * | 1,875,804 | 2316 | 103 | 386 |
| G8D | * | 1,573,598 | 2342 | 100 | 338 |
| | | | (Op: G3SJJ) | | |
| G3UFY | * | 1,591,668 | 1746 | 98 | 370 |
| G3WUX | * | 997,195 | 1968 | 77 | 278 |
| G3MXJ | * | 678,080 | 820 | 88 | 328 |
| G3NAS | * | 200,665 | 365 | 87 | 248 |
| GØDAY | * | 99,324 | 445 | 43 | 143 |
| G3BFP | * | 88,616 | 290 | 52 | 157 |
| **GØIVZ** | **14** | **653,805** | **2165** | **37** | **130** |
| **M7Z** | **"** | **633,290** | **2061** | **35** | **131** |
| | | | **(Op: G3VHB)** | | |
| G3YXX | * | 112,800 | 786 | 23 | 71 |
| **G3WGV** | **3.5** | **154,672** | **1008** | **19** | **93** |
| **M7M** | **"** | **110,010** | **764** | **18** | **77** |
| | | | **(Op: GØCKP)** | | |
| G3LZQ | * | 72,280 | 506 | 16 | 88 |
| ***G4KFT** | **A** | **733,720** | **900** | **88** | **327** |
| ***G3KKQ** | **"** | **609,636** | **859** | **84** | **320** |
| ***G3ZRJ** | **"** | **512,914** | **789** | **72** | **265** |
| *G3JJZ | * | 496,546 | 684 | 83 | 275 |
| *G4WFQ | * | 462,024 | 892 | 76 | 248 |
| *G3KKP | * | 450,848 | 764 | 67 | 225 |
| *GØUKX | * | 407,691 | 724 | 66 | 225 |
| *GØLZL | * | 311,892 | 644 | 57 | 180 |
| *M2W | * | 307,096 | 793 | 59 | 183 |
| | | | (Op: GØPZA) | | |
| *G5LP | * | 268,488 | 491 | 91 | 305 |
| *M8C | * | 218,268 | 544 | 66 | 192 |
| | | | (Op: G4DBL) | | |
| *G3RSD | * | 172,938 | 438 | 59 | 163 |
| *GØ/N9LYE | * | 134,871 | 444 | 45 | 156 |
| *MØAWV | * | 132,719 | 416 | 54 | 157 |
| *G4KIV | * | 120,802 | 424 | 48 | 161 |
| *G3KKJ | * | 108,402 | 386 | 51 | 127 |
| *MØZAK | * | 78,228 | 371 | 38 | 121 |
| *G2AFV | * | 78,090 | 225 | 55 | 135 |
| *G4SLE | * | 54,760 | 284 | 38 | 110 |
| *M5FUN | * | 33,798 | 227 | 33 | 96 |
| *G4EMT | * | 3,240 | 53 | 18 | 36 |
| *GØTKZ | 28 | 7,776 | 89 | 15 | 33 |
| ***M4T** | **14** | **94,586** | **798** | **19** | **67** |
| | | | **(Op: GØVOR)** | | |
| ***G3SEK** | **7** | **59,900** | **390** | **18** | **82** |
| *G3VYI | * | 30,005 | 285 | 17 | 68 |
| *M5ALG | * | 100 | 11 | 4 | 10 |
| ***G4VGO** | **1.8** | **40,508** | **522** | **11** | **65** |
| ***G3WPH** | **"** | **32,825** | **479** | **10** | **65** |

**ESTONIA**

| | | | | | |
|---|---|---|---|---|---|
| **ES1AJ** | **A** | **1,771,092** | **1944** | **126** | **495** |
| ES7FU | * | 225,720 | 522 | 58 | 227 |
| **ES2X** | **28** | **354,276** | **1203** | **34** | **122** |
| | | | **(Op: ES2RJ)** | | |
| ES6CO | * | 54,237 | 224 | 25 | 76 |
| **ES4RD** | **7** | **91,600** | **734** | **21** | **79** |
| **ES2EZ** | **3.5** | **75,516** | **830** | **16** | **68** |
| ***ES2DJ** | **A** | **1,196,598** | **1420** | **114** | **415** |
| *ES6PZ | * | 342,280 | 629 | 76 | 268 |
| *ES8DH | * | 80,545 | 348 | 44 | 137 |
| *ES1RF | * | 68,155 | 178 | 62 | 153 |
| ***ES4RC** | **28** | **31,296** | **190** | **24** | **72** |
| *ES1OX | * | 10,530 | 96 | 19 | 62 |
| *ES5GI | * | 1,769 | 39 | 10 | 19 |
| ***ES1TM** | **21** | **79,606** | **463** | **26** | **80** |

**EUROPEAN RUSSIA**

| | | | | | |
|---|---|---|---|---|---|
| **RV3FF** | **A** | **1,784,700** | **1746** | **149** | **512** |
| **RN6AL** | **"** | **1,565,688** | **1996** | **113** | **421** |
| RA3UT | * | 899,646 | 1177 | 103 | 370 |
| RA3XO | * | 644,878 | 868 | 102 | 340 |
| RA3FD | * | 640,683 | 1121 | 78 | 311 |
| RK3BX | * | 630,108 | 1052 | 94 | 320 |
| UA3UJE | * | 530,550 | 789 | 87 | 318 |
| RX3AEX | * | 500,253 | 1057 | 83 | 298 |
| RK3BA | * | 389,763 | 903 | 77 | 264 |
| RN6FA | * | 347,255 | 783 | 86 | 263 |
| RV1CC | * | 269,008 | 458 | 95 | 249 |
| RW4FO | * | 261,370 | 711 | 65 | 230 |
| RT3A | * | 238,875 | 1146 | 33 | 114 |
| | | | (Op: RU3AA) | | |
| UA3LEO | * | 217,140 | 538 | 69 | 213 |
| RW3TN | * | 211,393 | 441 | 77 | 222 |
| RN1CW | * | 182,776 | 419 | 60 | 188 |
| RN1AO | * | 173,420 | 332 | 84 | 206 |
| RV3ID | * | 148,393 | 267 | 79 | 222 |
| RK3AZ | * | 98,392 | 286 | 53 | 143 |
| RK3AD | * | 98,136 | 389 | 46 | 128 |
| RW6FO | * | 32,131 | 138 | 40 | 87 |
| RD4M | * | 31,356 | 184 | 29 | 88 |
| | | | (Op: UA4LU) | | |
| RV3MI | * | 15,049 | 81 | 38 | 63 |
| RU3MW | * | 14,268 | 136 | 20 | 67 |
| UA3XGM | * | 12,728 | 99 | 27 | 47 |
| UA3MNB | * | 3,550 | 30 | 20 | 30 |
| UA3MEJ | * | 272 | 9 | 8 | 9 |
| **RA3ANL** | **28** | **44,084** | **232** | **26** | **81** |
| RN1CX | 21 | 390 | 10 | 5 | 8 |
| **UA3DNR** | **14** | **200,032** | **988** | **31** | **102** |
| RW3XZ | * | 77,952 | 576 | 22 | 74 |
| UA1CEC | * | 44,185 | 410 | 20 | 77 |
| **RW6CF** | **7** | **112,200** | **600** | **28** | **104** |
| RW1ZZ | * | 66,744 | 344 | 29 | 79 |
| **UA1OMS** | **3.5** | **78,900** | **582** | **22** | **78** |
| **RN6CF** | **"** | **65,236** | **650** | **19** | **75** |
| RA4PO | * | 43,362 | 424 | 20 | 79 |
| UA4LY | * | 31,648 | 318 | 18 | 68 |
| RW3VZ | * | 20,088 | 257 | 10 | 52 |
| UA3LIZ | * | 17,880 | 292 | 9 | 51 |
| RW6AH | * | 17,324 | 254 | 10 | 51 |
| RW3WM | * | 10,206 | 183 | 11 | 52 |
| **RW4PL** | **1.8** | **72,261** | **528** | **18** | **75** |
| RA3DOX | * | 29,050 | 328 | 12 | 58 |
| UA4RC | * | 26,207 | 303 | 14 | 59 |
| RU3DX | * | 9,588 | 198 | 8 | 43 |
| ***UA4FER** | **A** | **2,211,201** | **2279** | **125** | **454** |
| ***RM3C** | **"** | **1,978,886** | **2120** | **124** | **457** |
| | | | **(Op: RA3CW)** | | |
| ***RA3AF** | **"** | **1,418,025** | **1667** | **122** | **433** |
| *RZ3DX | * | 903,925 | 1350 | 104 | 371 |
| *UA3PW | * | 887,260 | 1305 | 89 | 347 |
| *R4/VE3YDX | * | 831,186 | 2082 | 79 | 287 |
| | | | (Op: RW4WM) | | |
| *UA3AMY | * | 798,813 | 1479 | 95 | 296 |
| *RU4WE | * | 748,765 | 1324 | 81 | 310 |
| *RZ3AV | * | 732,633 | 1083 | 99 | 348 |
| *RA6AAW | * | 727,440 | 1055 | 96 | 324 |
| *RZ4AG | * | 700,128 | 920 | 107 | 335 |
| *RV3LO | * | 681,461 | 1049 | 90 | 361 |
| *RA3AUM | * | 671,118 | 1103 | 89 | 310 |
| *UA1OMZ | * | 670,878 | 1227 | 93 | 330 |
| *RA4HW | * | 665,660 | 1161 | 93 | 322 |
| *UA4LA | * | 602,975 | 1069 | 99 | 346 |
| *RN4SS | * | 509,439 | 1131 | 76 | 281 |
| *RK3FY | * | 477,360 | 884 | 76 | 275 |
| *RX3RZ | * | 473,405 | 940 | 81 | 284 |
| *UA4AN | * | 443,256 | 797 | 74 | 218 |
| *RA3TT | * | 389,004 | 655 | 76 | 232 |
| *UA3AMZ | * | 363,769 | 724 | 74 | 257 |
| *UA6NZ | * | 361,284 | 818 | 80 | 277 |
| *UA6HON | * | 360,360 | 630 | 88 | 242 |
| *UA4FEN | * | 347,652 | 663 | 77 | 271 |
| *RA3UAG | * | 317,531 | 676 | 63 | 248 |
| *UA3SAQ | * | 304,265 | 485 | 93 | 310 |
| *RZ4AO | * | 279,594 | 561 | 71 | 246 |
| *RW3SU | * | 262,599 | 568 | 74 | 249 |
|

| | | | | | |
|---|---|---|---|---|---|
| OH2RA | * | 1,927 | 28 | 16 | 25 |
| **OH2BP** | **28** | **231,642** | **722** | **32** | **121** |
| | | | (Op: OH2PQ) | | |
| OH2XF | * | 51,337 | 170 | 29 | 114 |
| **OH6AC** | **21** | **719,780** | **1918** | **35** | **135** |
| | | | (Op: OH6CS) | | |
| **OH4A** | **14** | **623,720** | **1996** | **36** | **119** |
| | | | (Op: OH6QU) | | |
| OH8L | * | 119,440 | 914 | 23 | 57 |
| | | | (Op: OH8LQ) | | |
| OH2BCD | * | 100 | 185 | 24 | 61 |
| **OH9DX** | **7** | **433,784** | **1269** | **36** | **136** |
| | | | (Op: OH7MA) | | |
| OH5XL | * | 118,720 | 732 | 29 | 111 |
| OH3WS | * | 71,958 | 294 | 28 | 106 |
| OH2BMH | * | 12,956 | 91 | 17 | 65 |
| **OH2BH** | **3.5** | **271,998** | **1233** | **30** | **116** |
| | | | (Op: OH1WZ) | | |
| OH3XR | * | 158,510 | 1107 | 27 | 94 |
| OH7N | * | 63,731 | 672 | 20 | 81 |
| | | | (Op: OH7UE) | | |
| OH2BEC | * | 42 | 6 | 2 | 5 |
| **OH3RR** | **1.8** | **3,350** | **50** | **7** | **43** |
| ***OH4R** | **A** | **1,949,516** | **1882** | **128** | **468** |
| | | | (Op: OH4YR) | | |
| ***OH4TY** | **"** | **506,022** | **867** | **82** | **292** |
| *OH6OS | * | 262,626 | 600 | 71 | 202 |
| *OH2EV | * | 196,800 | 511 | 57 | 189 |
| *OH6RC | * | 162,060 | 332 | 71 | 221 |
| *OH2LO | * | 138,595 | 394 | 57 | 208 |
| *OH3IR | * | 105,840 | 308 | 56 | 154 |
| *OH7HM | * | 83,349 | 354 | 42 | 147 |
| *OH3KOK | * | 42,645 | 199 | 42 | 103 |
| *OH6MBQ | * | 35,916 | 253 | 34 | 112 |
| *OH1AL | * | 22,108 | 126 | 34 | 76 |
| | | | (Op: OH1TG) | | |
| *OH1WR | * | 3,314 | 34 | 26 | 35 |
| *OH2HMB | * | 329 | 34 | 18 | 29 |
| *OH1VR | * | 100 | 13 | 13 | 13 |
| *OH7YN | * | 100 | 163 | 30 | 86 |
| ***OH1HD** | **28** | **232,680** | **698** | **33** | **135** |
| *OH6BG | * | 121,095 | 465 | 30 | 105 |
| *OH3TY | * | 104,400 | 337 | 28 | 116 |
| *OH2BNX | * | 15,688 | 112 | 19 | 57 |
| ***OH2BPA** | **7** | **30,636** | **302** | **19** | **73** |
| *OH4ML | 3.5 | 2,530 | 54 | 7 | 39 |
| | | **FRANCE** | | | |
| **F2JD** | **A** | **559,783** | **1129** | **88** | **291** |
| **F5RAB** | **"** | **548,098** | **1010** | **77** | **281** |
| F5BBD | * | 162,819 | 542 | 59 | 178 |
| F5CQ | * | 134,808 | 291 | 62 | 184 |
| F5YJ | * | 11,135 | 98 | 24 | 61 |
| **TM7XX** | **28** | **558,448** | **1547** | **35** | **132** |
| | | | (Op: F5MUX) | | |
| F5TGR | * | 93,955 | 648 | 26 | 89 |
| **F5OIH** | **7** | **127,322** | **758** | **22** | **96** |
| **F6FJE** | **3.5** | **40,275** | **455** | **13** | **62** |
| F8PDR | * | 16,590 | 192 | 10 | 60 |
| **F6CWA** | **1.8** | **32,627** | **403** | **11** | **68** |
| ***F5PHW** | **A** | **1,179,900** | **1484** | **100** | **360** |
| ***F6FTB** | **"** | **1,116,250** | **1331** | **100** | **370** |
| *F5JBR | * | 978,930 | 1246 | 98 | 349 |
| *F5VV | * | 631,620 | 995 | 81 | 282 |
| *F5ICC | * | 562,695 | 888 | 80 | 265 |
| *F5TNI | * | 497,880 | 942 | 87 | 273 |
| *F6FXW | * | 405,232 | 944 | 57 | 191 |
| *F2AR | * | 404,352 | 869 | 65 | 259 |
| *F5UKL | * | 350,750 | 1015 | 65 | 185 |
| *F8BJE | * | 279,216 | 550 | 65 | 187 |
| *F5PED | * | 271,114 | 585 | 67 | 216 |
| *F6DZD | * | 221,075 | 558 | 54 | 185 |
| *F5SGI | * | 213,120 | 454 | 65 | 175 |
| *F5PGJ | * | 183,885 | 597 | 52 | 153 |
| *F5UL | * | 172,500 | 523 | 64 | 186 |
| *F8AWQ | * | 157,358 | 499 | 48 | 154 |
| *F5JLV | * | 153,882 | 514 | 53 | 153 |
| *F5JOT | * | 116,820 | 382 | 45 | 153 |
| *F8BXS | * | 116,032 | 545 | 51 | 173 |
| *F8AAN | * | 113,498 | 455 | 46 | 108 |
| *F6AUS | * | 85,654 | 725 | 89 | 290 |
| *F8BJD | * | 67,284 | 353 | 50 | 128 |
| *F/G3VQO | * | 64,666 | 265 | 37 | 112 |
| *F3PZ | * | 64,320 | 286 | 39 | 121 |
| *F5RPB | * | 34,342 | 207 | 44 | 110 |
| *F5JDG | * | 11,084 | 114 | 16 | 52 |
| *F5PBL | * | 7,056 | 87 | 22 | 62 |
| *F2FX | * | 3,723 | 52 | 25 | 26 |
| *F5TMJ | * | 255 | 19 | 2 | 15 |
| ***F6KSV** | **28** | **104,210** | **662** | **21** | **64** |
| | | | (Op: ON4AUC) | | |
| ***F5JKK** | **21** | **241,488** | **829** | **30** | **114** |
| ***F6HHR** | **1.8** | **9,890** | **237** | **6** | **40** |
| | | **GERMANY** | | | |
| **DL4NAC** | **A** | **4,778,204** | **3303** | **146** | **522** |
| **DJ9DZ** | **"** | **2,540,774** | **2718** | **125** | **441** |
| **DL3YBM** | **"** | **2,038,160** | **1934** | **120** | **464** |
| DKØDO | * | 1,380,666 | 1807 | 103 | 323 |
| | | | (Op: DL1MGB) | | |
| DL1DTC | * | 903,360 | 1086 | 98 | 382 |
| DL6UNF | * | 822,426 | 1144 | 84 | 290 |
| DJ8RS | * | 820,395 | 792 | 115 | 416 |
| DL1VDL | * | 819,150 | 989 | 103 | 327 |
| DL5YM | * | 654,154 | 938 | 92 | 287 |
| DF3OL | * | 551,860 | 793 | 90 | 320 |
| DL1LOD | * | 450,160 | 1066 | 70 | 261 |
| DL5YR | * | 391,932 | 617 | 83 | 259 |
| DL4JYT | * | 383,760 | 809 | 84 | 285 |
| DL1JF | * | 350,982 | 700 | 78 | 255 |
| DJ2BC | * | 255,596 | 508 | 77 | 237 |
| DL6LAU | * | 253,080 | 396 | 83 | 297 |
| DL6YRM | * | 248,191 | 470 | 73 | 210 |
| DL3BRC | * | 245,917 | 491 | 76 | 225 |
| DJ4KW | * | 190,246 | 457 | 61 | 193 |
| DL3YA | * | 136,296 | 394 | 58 | 158 |
| DL7VAF | * | 134,211 | 310 | 65 | 184 |
| DM5JBN | * | 132,890 | 300 | 58 | 136 |
| DL1ZU | * | 110,544 | 244 | 63 | 133 |
| DL6RBH | * | 108,605 | 334 | 61 | 142 |
| DL3DRN | * | 64,170 | 198 | 50 | 88 |
| DL3DBY | * | 64,020 | 288 | 44 | 121 |
| DL5XAT | * | 62,586 | 270 | 39 | 132 |
| DL1EKD | * | 59,724 | 151 | 59 | 130 |
| DL6DVU | * | 56,808 | 243 | 47 | 119 |
| DL1SBF | * | 42,140 | 167 | 46 | 94 |
| DK4RL | * | 31,692 | 135 | 41 | 73 |
| DL9GMC | * | 26,986 | 153 | 32 | 71 |
| DL1YCF | * | 11,948 | 114 | 29 | 74 |
| DL2AXM | * | 9,840 | 87 | 24 | 58 |
| DL5ANS | * | 5,950 | 54 | 23 | 27 |
| DF5AU | * | 5,460 | 45 | 23 | 42 |
| **DH7KU** | **21** | **387,875** | **1369** | **35** | **110** |
| **DJ7IK** | **"** | **238,309** | **738** | **35** | **132** |
| DL4WA | * | 206,870 | 739 | 29 | 108 |
| DL9GRE | 14 | 11,651 | 125 | 15 | 46 |
| **DK8ZB** | **7** | **320,067** | **1359** | **33** | **126** |
| DK8TU | * | 110,166 | 653 | 24 | 98 |
| DK5IM | * | 76,220 | 616 | 21 | 82 |
| **DL7ON** | **3.5** | **215,325** | **1153** | **27** | **108** |
| **DJØMDR** | **"** | **152,181** | **1092** | **23** | **88** |
| DL1LH | * | 146,300 | 1041 | 18 | 92 |
| DL1CW | * | 63,911 | 859 | 13 | 66 |
| DJ1CW | * | 35,847 | 501 | 10 | 53 |
| DK7AN | * | 18,972 | 262 | 9 | 53 |
| DL5RBR | * | 1,696 | 46 | 5 | 27 |
| **DK9IP** | **1.8** | **26,520** | **372** | **8** | **57** |
| DK7ZT | * | 5,405 | 123 | 6 | 41 |
| ***DL1IAO** | **A** | **3,097,332** | **2704** | **131** | **481** |
| ***DL2OBF** | **"** | **2,265,088** | **2259** | **111** | **442** |
| ***DK5PD** | **"** | **2,100,756** | **1780** | **126** | **497** |
| ***DL5RMH** | **"** | **1,185,228** | **1465** | **96** | **342** |
| *DL5YYM | * | 1,129,500 | 1436 | 102 | 400 |
| *DL3BRA | * | 722,304 | 1119 | 83 | 313 |
| *DL5KUD | * | 710,092 | 889 | 99 | 353 |
| *DL8MUG | * | 551,478 | 1147 | 78 | 243 |
| *DL3NSM | * | 549,638 | 849 | 91 | 307 |
| *DL9MRF | * | 510,000 | 875 | 76 | 264 |
| *DJ3JD | * | 455,544 | 739 | 76 | 257 |
| *DF3QG | * | 439,460 | 657 | 88 | 277 |
| *DL2FDL | * | 435,183 | 1314 | 91 | 266 |
| *DL7UXG | * | 428,180 | 767 | 70 | 246 |
| *DK7ZH | * | 346,696 | 606 | 74 | 213 |
| *DJ8UV | * | 344,902 | 789 | 74 | 257 |
| *DJ4PT | * | 341,460 | 625 | 83 | 232 |
| *DJ9AO | * | 341,260 | 801 | 65 | 237 |
| *DL3ZAI | * | 341,020 | 658 | 65 | 230 |
| *DL3KWF | * | 321,160 | 751 | 67 | 243 |
| *DF2CH | * | 319,361 | 684 | 74 | 227 |
| *DK5ZX | * | 278,748 | 585 | 64 | 203 |
| *DL9ABM | * | 262,432 | 515 | 69 | 209 |
| *DJ2YE | * | 247,096 | 612 | 58 | 210 |
| *DL7RV | * | 201,240 | 484 | 61 | 197 |
| *DL3BZZ | * | 196,528 | 398 | 78 | 206 |
| *DL4HWI | * | 191,958 | 339 | 72 | 249 |
| *DF6LQ | * | 188,384 | 461 | 56 | 168 |
| *DL2DBS | * | 185,460 | 493 | 48 | 172 |
| *DL1IA | * | 180,810 | 300 | 83 | 204 |
| *DK3WN | * | 178,064 | 492 | 61 | 187 |
| *DL3HAA | * | 163,432 | 393 | 56 | 192 |
| *DL6ZNG | * | 161,138 | 374 | 65 | 161 |
| *DL1TH | * | 142,428 | 617 | 62 | 187 |
| *DL9JON | * | 141,687 | 291 | 68 | 205 |
| *DL7IZ | * | 139,738 | 274 | 71 | 147 |
| *DL5CD | * | 138,990 | 387 | 58 | 168 |
| *DJ5IR | * | 138,545 | 461 | 51 | 178 |
| *DL2RTJ | * | 129,600 | 416 | 50 | 142 |
| *DL8UVG | * | 123,966 | 343 | 57 | 156 |
| *DL8UGF | * | 120,696 | 335 | 50 | 138 |
| *DL2KWW | * | 109,590 | 260 | 62 | 133 |
| *DL3KWR | * | 107,352 | 372 | 53 | 163 |
| *DH1NFL | * | 99,994 | 359 | 52 | 121 |
| *DK5JM | * | 74,354 | 315 | 51 | 175 |
| *DJ3GE | * | 69,580 | 253 | 43 | 99 |
| *DL5AOJ | * | 64,960 | 243 | 49 | 111 |
| *DL2AL | * | 59,388 | 199 | 46 | 101 |
| *DL1YFF | * | 55,180 | 208 | 49 | 106 |
| *DL1KUR | * | 54,312 | 195 | 50 | 96 |
| *DL8NBJ | * | 47,094 | 229 | 38 | 129 |
| *DK7DN | * | 45,560 | 261 | 39 | 95 |
| *DL1TS | * | 42,048 | 191 | 42 | 104 |
| *DF7PM | * | 41,693 | 301 | 48 | 125 |
| *DL8UNF | * | 38,962 | 283 | 42 | 119 |
| *DL8JDX | * | 27,848 | 116 | 41 | 77 |
| *DH1TW | * | 26,988 | 162 | 27 | 51 |
| *DL6JFT | * | 22,627 | 194 | 35 | 86 |
| *DK7FP | * | 14,184 | 110 | 23 | 49 |
| *DM3XI | * | 13,209 | 74 | 45 | 66 |
| *DF2AP | * | 12,200 | 105 | 29 | 71 |
| *DL1BUG | * | 11,078 | 71 | 25 | 33 |
| *DL2ARG | * | 10,712 | 81 | 42 | 62 |
| *DL8DZV | * | 8,611 | 57 | 34 | 45 |
| *DL5FCO | * | 7,992 | 103 | 24 | 48 |
| *DL2ASK | * | 7,659 | 112 | 23 | 46 |
| *DK9KW | * | 4,284 | 51 | 19 | 32 |
| *DL9GUN | * | 2,668 | 75 | 13 | 45 |
| *DL1ARD | * | 2,160 | 53 | 24 | 36 |
| *DL6UBF | * | 888 | 16 | 9 | 15 |
| *DL7VRG | * | 884 | 18 | 12 | 14 |
| *DK7MCX | * | 100 | 17 | 8 | 15 |
| ***DL4UL** | **28** | **128,423** | **436** | **33** | **184** |
| *DL9ZP | * | 67,617 | 314 | 20 | 79 |
| *DJ6TK | * | 58,374 | 263 | 21 | 73 |
| *DL3KUM | * | 56,100 | 272 | 22 | 78 |
| *DL8ZAJ | * | 44,116 | 226 | 22 | 60 |
| *DJ5IW | * | 29,232 | 183 | 24 | 60 |
| *DL4KUG | * | 19,908 | 138 | 18 | 61 |
| *DL1DTF | * | 11,336 | 107 | 16 | 36 |
| *DL1FMG | * | 7,708 | 95 | 14 | 27 |
| *DL2MIH | * | 5,324 | 50 | 16 | 28 |
| *DJ3EF | * | 3,024 | 46 | 13 | 23 |
| *DL8DXL | * | 2,484 | 38 | 11 | 25 |
| *DK9HE | * | 100 | 21 | 8 | 11 |
| ***DL2RUG** | **21** | **120,780** | **422** | **30** | **102** |
| ***DJ1WQ** | **"** | **99,825** | **421** | **26** | **95** |
| *DL4AAE | * | 87,720 | 323 | 26 | 94 |
| ***DJ5GG** | **14** | **100,947** | **455** | **29** | **104** |
| *DL5RCW | * | 100 | 41 | 7 | 25 |
| ***DHØDX** | **7** | **73,815** | **370** | **28** | **105** |
| | | | (Op: DL1YAW) | | |
| *DKØIW | * | 50,710 | 453 | 24 | 86 |
| | | | (Op: DF9MV) | | |
| *DJ2XC | * | 49,284 | 360 | 20 | 91 |
| *DL1EMH | * | 44,175 | 303 | 21 | 74 |
| *DJ4IC | * | 6,188 | 165 | 14 | 54 |
| ***DF1HF** | **1.8** | **16,632** | **278** | **8** | **58** |
| *DJ3RA | * | 3,276 | 106 | 4 | 32 |
| *DL1WA | * | 2,788 | 90 | 5 | 36 |
| | | **GREECE** | | | |
| ***SV1ENG** | **A** | **802,812** | **2241** | **64** | **234** |
| *SW1W | * | 255,510 | 872 | 68 | 238 |
| | | | (Op: SV1DPJ) | | |
| *SV1BJW | * | 209,296 | 543 | 65 | 189 |
| *SV1DZB | * | 29,808 | 212 | 43 | 119 |
| *SV1DNW | 14 | 16,756 | 208 | 14 | 57 |
| *SV1DKR | 7 | 5,408 | 95 | 14 | 38 |
| ***SV1NA** | **1.8** | **61,920** | **705** | **13** | **57** |
| | | **GUERNSEY** | | | |
| **MU5X** | **A** | **3,101,527** | **3384** | **118** | **415** |
| | | | (Op: G4TSH) | | |
| **GU4EON** | **7** | **44,968** | **412** | **18** | **70** |
| ***MUØFAL** | **A** | **254,535** | **610** | **57** | **182** |
| *GUØSUP | * | 17,748 | 98 | 32 | 55 |
| ***GU4YOX** | **1.8** | **38,860** | **607** | **10** | **57** |
| | | **HUNGARY** | | | |
| **HA3LI** | **A** | **1,716,975** | **1853** | **122** | **463** |
| HA3PT | * | 745,025 | 1214 | 96 | 329 |
| HA3OU | * | 365,532 | 619 | 87 | 245 |
| HG8W | * | 310,590 | 585 | 73 | 182 |
| | | | (Op: HA8ZO) | | |
| HA8BE | * | 78,715 | 818 | 14 | 77 |
| **HA1A** | **28** | **296,672** | **1182** | **35** | **92** |
| | | | (Op: HA1YA) | | |
| HG5C | * | 284,214 | 1149 | 33 | 101 |
| HA3MN | * | 170,226 | 521 | 33 | 114 |
| HA8UH | * | 1,196 | 54 | 17 | 29 |
| **HA8RH** | **21** | **349,448** | **1139** | **34** | **118** |
| **HA9SU** | **7** | **473,838** | **1741** | **32** | **119** |
| HA8A | * | 194,400 | 874 | 31 | 119 |
| | | | (Op: HA8DZ) | | |
| **HG9M** | **3.5** | **82,296** | **1008** | **14** | **67** |
| | | | (Op: HA9RU) | | |
| **HA8IB** | **1.8** | **48,807** | **728** | **16** | **71** |
| ***HA6IAM** | **A** | **561,528** | **965** | **89** | **307** |
| ***HA8MT** | **"** | **334,465** | **1396** | **31** | **120** |
| *HA8AR | * | 277,020 | 789 | 65 | 178 |
| *HA5PT | * | 217,120 | 453 | 65 | 171 |
| *HA6FQ/9 | * | 137,100 | 451 | 71 | 229 |
| *HA8IC | * | 100,282 | 341 | 39 | 94 |
| ***HA8IH** | **21** | **412,160** | **1315** | **33** | **127** |
| *HA9PP | * | 225,732 | 724 | 32 | 124 |
| *HA3JB | * | 151,088 | 534 | 32 | 120 |
| ***HA8JV** | **7** | **226,800** | **886** | **32** | **112** |
| *HA8MD | * | 126,996 | 651 | 23 | 91 |
| *HA8CQ | * | 22,052 | 208 | 17 | 57 |
| ***HA8EU** | **3.5** | **87,370** | **952** | **15** | **75** |
| | | **ICELAND** | | | |
| TF3MM | A | 17,052 | 166 | 19 | 79 |
| **TF3IRA** | **21** | **463,896** | **2224** | **30** | **106** |
| | | | (Op: TF3CW) | | |
| ***TF3GB** | **A** | **460,656** | **1303** | **60** | **192** |
| *TF8SM | * | 182,676 | 765 | 42 | 114 |
| *TF3AO | * | 3,248 | 51 | 17 | 39 |
| | | **IRELAND** | | | |
| **EI4BZ** | **A** | **1,913,512** | **2542** | **95** | **329** |
| EI6FR | * | 304,480 | 916 | 55 | 165 |
| ***EI4CF** | **28** | **63,612** | **279** | **24** | **90** |
| *EI5DI | * | 58,955 | 395 | 16 | 49 |
| | | **ISLE OF MAN** | | | |
| **MD6V** | **28** | **444,091** | **1779** | **33** | **118** |
| | | | (Op: MØBEW) | | |
| | | **ITALY** | | | |
| **IK3UNA** | **A** | **1,525,160** | **1890** | **118** | **337** |
| **IV3TQE** | **"** | **1,057,785** | **1298** | **103** | **382** |
| IK4ZHH | * | 701,895 | 992 | 91 | 274 |
| IK2UCK | * | 555,940 | 1036 | 78 | 230 |
| IK1SPR | * | 404,808 | 728 | 90 | 244 |
| IK1RQQ | * | 296,240 | 547 | 70 | 210 |
| IK2AOO | * | 167,832 | 435 | 58 | 164 |
| **IR4T** | **28** | **597,324** | **1483** | **36** | **146** |
| | | | (Op: IK4UPB) | | |
| IK3QAR | * | 284,809 | 794 | 34 | 127 |
| **IO4L** | **21** | **502,203** | **1637** | **34** | **129** |
| | | | (Op: I4LCK) | | |
| IZ2AVK | * | 130,644 | 608 | 26 | 88 |
| IO2A | * | 104,550 | 374 | 30 | 120 |
| | | | (Op: IK2RZP) | | |
| **IR4B** | **1.8** | **17,110** | **318** | **8** | **50** |
| | | | (Op: IK4AUY) | | |
| IK4MGP | * | 13,192 | 209 | 12 | 56 |
| ***IK4EWX** | **A** | **891,248** | **1225** | **89** | **335** |
| ***IK4UNH** | **"** | **605,506** | **853** | **84** | **290** |
| ***IN3FHE** | **"** | **576,334** | **882** | **83** | **291** |
| *IK8WEI | * | 505,850 | 903 | 69 | 233 |
| *IK3SCB | * | 232,804 | 671 | 65 | 177 |
| *IK2NUX | * | 218,500 | 410 | 73 | 177 |
| *IK2WXQ | * | 203,456 | 708 | 59 | 213 |
| *IK4VET | * | 167,790 | 499 | 59 | 151 |
| *IK2ULV | * | 139,050 | 478 | 74 | 196 |
| *IZØANC | * | 132,308 | 400 | 52 | 142 |
| *IK2WYW | * | 124,960 | 427 | 44 | 132 |
| *I4FGG | * | 115,500 | 381 | 53 | 157 |
| *IK2RLS | * | 67,660 | 239 | 49 | 121 |
| *IN3ZWF | * | 58,366 | 310 | 33 | 121 |
| *IZ8FAV | * | 45,850 | 193 | 43 | 88 |
| *IK2FIQ | * | 32,256 | 190 | 38 | 74 |
| *IK2WYI | * | 24,095 | 105 | 32 | 47 |
| *IKØWRB | * | 21,004 | 100 | 45 | 73 |
| *IZ2EID | * | 13,056 | 116 | 21 | 43 |
| *I4JEE | * | 11,811 | 70 | 33 | 60 |
| *IV3KSE | * | 11,286 | 80 | 25 | 32 |
| *IZØBPI | * | 7,540 | 74 | 22 | 43 |
| *IZ1DBY | * | 2,752 | 48 | 12 | 31 |
| ***IK7JWY** | **28** | **256,734** | **783** | **32** | **121** |
| *IØJFE | * | 50,406 | 244 | 19 | 74 |
| ***I7PXV** | **21** | **112,080** | **529** | **27** | **93** |
| *IK3HUG | * | 52,510 | 309 | 21 | 68 |
| *IQ5B | * | 28,567 | 188 | 19 | 58 |
| | | | (Op: I5VXG) | | |
| ***IQ2A** | **7** | **53,534** | **456** | **15** | **55** |
| | | | (Op: I2UIY) | | |
| *IK8UND | * | 238 | 14 | 4 | 10 |
| *IK3ORD | * | 100 | 27 | 5 | 19 |
| ***IV3OWC** | **1.8** | **20,636** | **347** | **11** | **56** |
| | | **JERSEY** | | | |
| **GJ2A** | **A** | **2,038,068** | **2516** | **93** | **359** |
| | | | (Op: K2WR) | | |
| ***MJØASP** | **7** | **40,495** | **287** | **14** | **77** |
| | | | (Op: F5SHQ) | | |
| | | **KALININGRAD** | | | |
| **RA2FBC** | **A** | **671,300** | **961** | **81** | **269** |
| UA2CZ | * | 428,485 | 677 | 80 | 275 |
| | | **LATVIA** | | | |
| **YL2SM** | **A** | **2,529,424** | **2420** | **146** | **450** |
| **YL2KO** | **"** | **2,275,902** | **2373** | **134** | **423** |
| **YL6W** | **"** | **2,169,258** | **2261** | **126** | **420** |
| YL2SW | * | 497,458 | 985 | 73 | 288 |
| YL2TW | * | 80,134 | 155 | 68 | 138 |
| **YLØA** | **3.5** | **253,920** | **1383** | **28** | **110** |
| | | | (Op: YL2KA) | | |
| YL2GQT | * | 105,938 | 998 | 16 | 82 |
| **YL2PQ** | **1.8** | **74,866** | **871** | **14** | **68** |
| YL2VW | * | 38,269 | 460 | 11 | 60 |
| ***YL5M** | **A** | **721,403** | **1385** | **129** | **300** |
| ***YL2GN** | **"** | **658,143** | **1054** | **92** | **326** |
| *YL2PP | * | 203,412 | 579 | 70 | 206 |
| *YL2EC | * | 200,511 | 476 | 68 | 229 |
| *YL2IP | * | 110,860 | 296 | 70 | 171 |
| *YL2GTD | * | 25,654 | 234 | 23 | 78 |
| *YL2II | * | 15,458 | 205 | 31 | 100 |
| *YL3RW | * | 2,790 | 49 | 15 | 30 |
| ***YL2HA** | **28** | **42,744** | **238** | **24** | **80** |
| *YL2NK | 21 | 17,424 | 159 | 17 | 55 |
| ***YL2BJ** | **14** | **101,626** | **561** | **27** | **92** |
| | | **LIECHTENSTEIN** | | | |
| ***HBØ/DK3KD** | **A** | **1,047,744** | **1660** | **89** | **319** |
| *HBØ/DJØIP | * | 356,095 | 866 | 70 | 241 |
| | | **LITHUANIA** | | | |
| **LY1CX** | **A** | **1,461,460** | **1174** | **146** | **569** |
| LY2HN | * | 917,412 | 977 | 112 | 422 |
| LY2MM | * | 694,937 | 813 | 99 | 340 |
| LY2OO | * | 291,696 | 672 | 71 | 238 |
| **LY2OX** | **28** | **334,324** | **951** | **34** | **132** |
| **LY2OU** | **7** | **100,720** | **613** | **36** | **91** |
| LY2BBI | * | 49,565 | 199 | 23 | 92 |
| **LY2BW** | **3.5** | **207,888** | **1271** | **27** | **95** |
| LY5W | * | 82,838 | 717 | 20 | 77 |
| | | | (Op: LY1DR) | | |
| ***LY7Z** | **A** | **3,976,576** | **3183** | **147** | **514** |
| | | | (Op: LY2TA) | | |
| ***LY9A** | **"** | **2,649,402** | **2615** | **129** | **473** |
| | | | (Op: LY3BA) | | |
| *LY2TE | * | 577,647 | 1122 | 88 | 283 |
| *LY3BX | * | 554,166 | 961 | 66 | 240 |
| *LY2FN | * | 518,940 | 949 | 82 | 290 |
| *LY2DX | * | 172,125 | 487 | 55 | 200 |
| *LY3ID | * | 100,667 | 271 | 57 | 140 |
| *LY1CT | * | 52,530 | 227 | 39 | 131 |
| ***LY2AT** | **28** | **51,168** | **214** | **26** | **78** |
| *LY2LF | 14 | 5,734 | 87 | 15 | 32 |
| ***LY6A** | **7** | **281,586** | **1242** | **30** | **112** |
| | | | (Op: LY2BM) | | |
| *LY3UM | 1.8 | 41,554 | 514 | 13 | 66 |
| *LY2GW | * | 14,841 | 297 | 7 | 44 |
| | | **LUXEMBOURG** | | | |
| *LX1NO | A | 1,813 | 30 | 15 | 22 |
| | | **MACEDONIA** | | | |
| **Z32XX** | **A** | **2,735,874** | **2904** | **126** | **432** |
| Z31MM | 3.5 | 130 | 14 | 4 | 9 |
| ***Z35G** | **A** | **68,820** | **311** | **40** | **115** |
| ***Z36W** | **28** | **463,680** | **1501** | **34** | **127** |
| ***Z37M** | **7** | **75,520** | **680** | **18** | **62** |
| ***Z33F** | **1.8** | **51,170** | **730** | **10** | **60** |
| | | **MOLDOVA** | | | |
| *ER1CW | 21 | 16,830 | 156 | 14 | 52 |
| ***ER1OO** | **1.8** | **38,556** | **579** | **9** | **59** |
| | | **NETHERLANDS** | | | |
| **PAØJNH** | **A** | **431,904** | **765** | **74** | **278** |
| PA5WT | 7 | 60,325 | 510 | 20 | 75 |
| ***PA3AAV** | **A** | **1,831,640** | **1812** | **121** | **459** |
| ***PA3BFH** | **"** | **1,081,572** | **1421** | **94** | **373** |
| *PAØADP | * | 548,632 | 944 | 86 | 302 |
| *PAØJR | * | 432,564 | 869 | 79 | 260 |
| *PA3EMN | * | 396,582 | 757 | 69 | 245 |
| *PAØCYW | * | 361,544 | 663 | 80 | 264 |
| *PA5FN | * | 204,750 | 534 | 58 | 167 |
| *PA5GU | * | 113,094 | 331 | 46 | 137 |
| *PAØCOR | * | 68,556 | 290 | 49 | 148 |
| *PA3FGJ | * | 64,950 | 246 | 46 | 104 |
| *PA3HGF | * | 60,952 | 218 | 47 | 105 |
| *PA2ALF | * | 55,024 | 248 | 47 | 105 |
| *PAØRBS | * | 38,070 | 233 | 41 | 100 |
| *PA3CEF | * | 29,205 | 121 | 35 | 64 |
| *PA9CW | * | 27,305 | 128 | 39 | 88 |
| *PAØLSK | * | 14,935 | 128 | 30 | 73 |
| *PA3CAL | * | 11,520 | 77 | 30 | 50 |
| *PA7RA | * | 4,485 | 67 | 22 | 47 |
| ***PAØMIR** | **28** | **57,346** | **239** | **23** | **83** |
| *PAØBWL | * | 43,360 | 256 | 18 | 62 |
| ***PAØRRS** | **21** | **97,812** | **404** | **25** | **92** |
| *PA3GNO | 7 | 12,610 | 125 | 13 | 52 |
| ***PAØMBD** | **3.5** | **26,350** | **302** | **15** | **70** |
| *PA3BNT | * | 4,800 | 116 | 6 | 34 |
| ***PA3GVI** | **1.8** | **7,254** | **122** | **8** | **54** |
| | | **NORTHERN IRELAND** | | | |
| **GI4KSH** | **A** | **52,681** | **228** | **39** | **100** |
| ***GI4SNC** | **21** | **127,088** | **795** | **21** | **73** |
| | | **NORWAY** | | | |
| **LA7MFA** | **A** | **1,693,748** | **2213** | **103** | **379** |
| LA5HE | * | 484,878 | 709 | 90 | 332 |
| LA8PDA | * | 421,572 | 1069 | 61 | 197 |
| LA1CCA | * | 28,908 | 155 | 37 | 95 |
| **LA6YEA** | **28** | **390,432** | **1168** | **35** | **133** |
| LA1H | 14 | 11,564 | 122 | 21 | 38 |
| | | | (Op: UA4WEC) | | |
| ***LA3BO** | **A** | **1,167,235** | **1602** | **91** | **354** |
| *LA7TO | * | 51,975 | 249 | 49 | 116 |
| *LA8PV | * | 33,354 | 114 | 53 | 100 |
| *LB8AE | * | 17,544 | 146 | 26 | 76 |
| *LA8CE | * | 11,840 | 76 | 33 | 41 |
| *LA8HGA | * | 1,836 | 23 | 15 | 21 |
| ***LA8OM** | **28** | **111,150** | **478** | **22** | **92** |
| ***LA1QDA** | **21** | **33,299** | **338** | **15** | **56** |
| *LA9DK | * | 4,150 | 56 | 11 | 14 |
| ***LA1YE** | **14** | **113,088** | **633** | **26** | **88** |
| | | **POLAND** | | | |
| **SN7Q** | **A** | **4,949,340** | **4011** | **149** | **511** |
| | | | (Op: SP7GIQ) | | |
| SP7JQQ | * | 480,930 | 773 | 100 | 291 |
| SP5KVW | * | 324,816 | 1198 | 93 | 309 |
| SP9KTL | * | 97,811 | 379 | 50 | 107 |
| SP3KRE | * | 92,868 | 387 | 34 | 108 |
| | | | (Op: SQ3HTX) | | |
| SP2FGO | * | 91,959 | 296 | 56 | 147 |
| SP2IW | * | 76,042 | 249 | 53 | 144 |
| SP2DWA | * | 6,206 | 52 | 22 | 36 |
| SP8FHM | * | 5,369 | 35 | 26 | 33 |
| **SP4DGN** | **28** | **204,130** | **731** | **33** | **116** |
| **SP3GEM** | **21** | **536,860** | **1525** | **35** | **135** |
| SP4DEU | * | 348,565 | 1038 | 33 | 128 |
| SP5WA | * | 287,532 | 928 | 32 | 115 |
| SP6AZT | * | 279,774 | 962 | 34 | 123 |
| SP2QG | * | 160,347 | 628 | 31 | 98 |
| **SN2A** | **14** | **336,238** | **1335** | **34** | **112** |
| | | | (Op: SQ2EAK) | | |
| SP6ZBX | * | 233,955 | 1103 | 31 | 104 |
| | | | (Op: SP5UAF) | | |
| SP2JGK | * | 15,436 | 183 | 14 | 54 |
| **SP9W** | **7** | **192,105** | **1077** | **27** | **108** |
| | | | (Op: SP9HWN) | | |
| SP3FYX | * | 34,128 | 437 | 23 | 85 |
| **SO2R** | **3.5** | **403,368** | **1778** | **31** | **115** |
| | | | (Op: SP2FAX) | | |
| **SP3KEY** | **"** | **183,260** | **1269** | **21** | **98** |
| | | | (Op: SP3HRN) | | |
| SP3GTS | * | 116,844 | 822 | 20 | 87 |
| SP9XCN | * | 73,036 | 861 | 10 | 66 |
| SQ2HEB | * | 36,080 | 410 | 14 | 66 |
| SP9DUX | * | 15,300 | 295 | 8 | 43 |
| SP9DNO | * | 9,222 | 171 | 10 | 48 |
| SP8GNF | * | 1,820 | 72 | 5 | 30 |
| **SP6AEG** | **1.8** | **35** | **4** | **3** | **4** |
| ***SP4ZO** | **A** | **1,978,704** | **2190** | **113** | **433** |
| ***SP9NSV/7** | **"** | **869,892** | **1284** | **95** | **331** |
| ***SP3PL** | **"** | **868,980** | **1001** | **104** | **381** |
| ***SP1AEN** | **"** | **749,280** | **1052** | **91** | **329** |
| *SP3VT | * | 719,186 | 1234 | 82 | 316 |
| *SP2FWC | * | 688,444 | 959 | 87 | 349 |
| *SQ9FMU | * | 589,780 | 911 | 85 | 285 |
| *SP9GFI | * | 554,250 | 997 | 80 | 295 |
| *SP8BVN | * | 533,902 | 809 | 84 | 299 |
| *SP6LV | * | 496,252 | 909 | 82 | 306 |
| *SP3DIK | * | 439,668 | 765 | 80 | 244 |
| *SQ9BZ | * | 425,385 | 707 | 86 | 259 |
| *SP3HC | * | 316,092 | 643 | 68 | 216 |
| *SP9GKM | * | 311,880 | 698 | 64 | 212 |
| *SP2UKB | * | 303,003 | 556 | 61 | 196 |
| *SP7VCA | * | 280,140 | 541 | 70 | 206 |
| *SP2DNI | * | 274,274 | 696 | 66 | 208 |
| *SP5ATO | * | 269,244 | 435 | 87 | 190 |
| *SP9FT | * | 207,399 | 490 | 67 | 202 |
| *SQ9MZ | * | 200,282 | 490 | 60 | 179 |
| *SP9MRQ | * | 179,550 | 527 | 61 | 209 |
| *SP9SOU | * | 176,358 | 433 | 55 | 183 |
| *SP6CES | * | 155,033 | 432 | 67 | 162 |
| *SP9VEG | * | 118,800 | 293 | 65 | 160 |
| *SP4BOS | * | 100,858 | 386 | 51 | 160 |
| *SQ9ZM | * | 100,000 | 295 | 57 | 143 |
| *SP3CNP | * | 96,288 | 262 | 62 | 142 |
| *SP6CZ | * | 95,976 | 331 | 90 | 254 |
| *SQ9D

| | | | | | |
|---|---|---|---|---|---|
| *YO9DQ | * | 4,554 | 54 | 15 | 18 |
| **YO3FLQ** | **28** | **50,825** | **283** | **25** | **70** |
| *YO5PBW | * | 20,942 | 138 | 25 | 49 |
| *YO8DHD | * | 3,960 | 52 | 17 | 28 |
| *YO8TRS | * | 570 | 10 | 9 | 10 |
| *YO2AQB | * | 245 | 71 | 20 | 29 |
| **YO8KOS** | **21** | **149,092** | **675** | **35** | **112** |
| | | | (Op: YO8AXP) | | |
| *YO4BBH | * | 70,483 | 425 | 28 | 80 |
| *YO4ATW | * | 61,054 | 351 | 27 | 71 |
| *YO4RHK | * | 37,080 | 293 | 24 | 79 |
| *YO4BSM | * | 247 | 7 | 6 | 7 |
| **YO8KGA** | **14** | **145,883** | **1022** | **28** | **85** |
| *YO3JW | * | 7,182 | 115 | 12 | 51 |
| **YO9AGI** | **7** | **22,950** | **469** | **17** | **68** |
| *YO9HG | * | 6,120 | 150 | 8 | 43 |
| **YO2BEH** | **1.8** | **19,239** | **377** | **8** | **45** |
| | | SARDINIA | | | |
| **ISØOMH** | **A** | **342,414** | **740** | **78** | **228** |
| *ISØVSG | * | 68,529 | 231 | 45 | 114 |
| *ISØLDT | * | 4,464 | 122 | 19 | 74 |
| **ISØRDY** | **28** | **35,760** | **186** | **22** | **58** |
| *ISØSDX | * | 13,350 | 235 | 15 | 35 |
| **ISØUWX** | **14** | **13,594** | **253** | **20** | **62** |
| | | SCOTLAND | | | |
| **GM4YXI** | **A** | **2,937,348** | **2859** | **128** | **428** |
| **GMØF** | **"** | **2,814,278** | **3292** | **121** | **417** |
| | | | (Op: GM4AFF) | | |
| GM4SID | * | 1,013,845 | 1512 | 87 | 328 |
| GM3JKS | * | 476,850 | 979 | 79 | 210 |
| **GM4AGG** | **21** | **320,625** | **1297** | **29** | **106** |
| **GM4FDM** | **7** | **226,588** | **1220** | **32** | **116** |
| **GMØTGE** | **A** | **101,460** | **441** | **61** | **167** |
| **GM3CFS** | **21** | **123,288** | **483** | **27** | **105** |
| **GM3YOR** | **3.5** | **60,839** | **607** | **15** | **68** |
| | | SICILY | | | |
| **IU9S** | **28** | **602,301** | **1865** | **34** | **127** |
| | | | (Op: OK1DSZ) | | |
| **IT9BLB** | **14** | **519,871** | **1749** | **38** | **129** |
| **IT9/OL5Y** | **7** | **449,645** | **1872** | **34** | **111** |
| | | | (Op: OK1FUA) | | |
| **IT9ZGY** | **1.8** | **39,176** | **435** | **12** | **71** |
| **IT9ORA** | **A** | **616,224** | **1001** | **84** | **308** |
| *IT9GAC | * | 605,192 | 765 | 104 | 324 |
| *IT9AJP | * | 124,490 | 307 | 58 | 153 |
| *IT9BOR | * | 24,931 | 137 | 31 | 76 |
| *IT9LGW | * | 6,370 | 155 | 39 | 91 |
| **IQ9AF** | **21** | **111,024** | **918** | **28** | **80** |
| | | SLOVAK REPUBLIC | | | |
| **OM3IAG** | **A** | **1,086,512** | **1621** | **103** | **333** |
| OM4JD | * | 13,640 | 85 | 36 | 74 |
| **OM6RM** | **A** | **929,016** | **1529** | **94** | **320** |
| **OM7CA** | **"** | **881,588** | **1242** | **89** | **344** |
| **OMØC** | **"** | **802,049** | **1115** | **94** | **315** |
| | | | (Op: OM2TW) | | |
| *OM4DN | * | 767,922 | 1158 | 82 | 311 |
| *OM4TX | * | 693,310 | 1068 | 92 | 318 |
| *OM8ON | * | 682,752 | 752 | 107 | 341 |
| *OM7AG | * | 597,173 | 1177 | 79 | 294 |
| *OM8AQ | * | 562,600 | 1010 | 89 | 299 |
| *OM7RU | * | 510,066 | 890 | 88 | 299 |
| *OM8FF | * | 484,536 | 1096 | 73 | 239 |
| *OM3PQ | * | 409,200 | 675 | 73 | 268 |
| *OM1II | * | 299,460 | 587 | 75 | 247 |
| *OM3BA | * | 234,042 | 624 | 61 | 229 |
| *OM3ROM | * | 215,468 | 630 | 59 | 177 |
| | | | (Op: OM4TQ) | | |
| *OM7AT | * | 201,545 | 589 | 47 | 186 |
| *OM3GB | * | 164,193 | 305 | 68 | 171 |
| *OM1AF | * | 146,664 | 631 | 30 | 159 |
| *OM7VF | * | 131,810 | 548 | 55 | 190 |
| *OM8HG | * | 124,762 | 404 | 56 | 158 |
| *OM1AW | * | 86,373 | 333 | 47 | 142 |
| *OM3CPW | * | 15,184 | 79 | 26 | 47 |
| *OMØTT | * | 14,620 | 120 | 22 | 63 |
| *OM4AMA | * | 2,288 | 73 | 14 | 38 |
| **OM2VL** | **21** | **322,677** | **896** | **35** | **136** |
| *OM7YC | * | 101,184 | 394 | 27 | 97 |
| **OM2AK** | **14** | **37,044** | **235** | **23** | **75** |
| *OM8AG | 7 | 17,404 | 195 | 15 | 61 |
| | | SLOVENIA | | | |
| **S52A** | **A** | **2,836,608** | **2186** | **139** | **525** |
| **S53EO** | **"** | **2,681,102** | **2843** | **116** | **362** |
| **S57AL** | **28** | **420,750** | **1288** | **34** | **131** |
| **S57O** | **21** | **662,815** | **1850** | **36** | **140** |
| | | | (Op: S51TA) | | |
| S51FB | * | 391,087 | 1272 | 35 | 122 |
| **S53Z** | **14** | **159,936** | **875** | **27** | **75** |
| **S52LW** | **7** | **216,976** | **997** | **31** | **111** |
| **S57AW** | **3.5** | **310,310** | **1579** | **30** | **113** |
| **S5ØU** | **"** | **244,440** | **1486** | **25** | **101** |
| S5ØC | * | 238,022 | 1510 | 24 | 98 |
| | | | (Op: S53MM) | | |
| S51W | * | 77,605 | 856 | 16 | 67 |
| S52W | * | 68,400 | 872 | 11 | 64 |
| S57NRO | * | 31,395 | 566 | 9 | 56 |
| S51NM | * | 29,337 | 307 | 13 | 64 |
| S51VC | * | 12,150 | 230 | 9 | 41 |
| S52LO | * | 5,184 | 128 | 7 | 41 |
| **S5ØN** | **1.8** | **28,704** | **419** | **12** | **66** |
| **S51F** | **A** | **1,559,525** | **1585** | **110** | **425** |
| *S57U | * | 474,531 | 749 | 88 | 279 |
| *S52GO | * | 421,515 | 792 | 75 | 248 |
| *S59TTT | * | 182,063 | 545 | 55 | 162 |
| | | | (Op: S51DU) | | |
| *S57AY | * | 111,081 | 330 | 44 | 139 |
| *S59ZZ | * | 52,215 | 135 | 62 | 115 |
| *S58RU | * | 27,606 | 337 | 54 | 160 |
| *S52T | * | 4,048 | 40 | 19 | 27 |
| *S59V | * | 624 | 22 | 12 | 12 |
| **S57J** | **28** | **256,350** | **767** | **33** | **117** |
| **S53AK** | **21** | **167,202** | **802** | **29** | **97** |
| *S51J | * | 55,180 | 404 | 24 | 65 |
| **S57DX** | **14** | **363,552** | **1294** | **34** | **134** |
| *S57Z | * | 257,546 | 1268 | 31 | 100 |
| *S58M | * | 128,871 | 756 | 28 | 101 |
| **S54A** | **7** | **226,349** | **986** | **30** | **121** |
| *S53F | * | 161,414 | 1018 | 24 | 97 |
| **S57L** | **1.8** | **29,862** | **489** | **7** | **56** |
| | | SPAIN | | | |
| **EA4TX** | **A** | **1,991,101** | **2827** | **103** | **324** |
| **EA4NP** | **"** | **1,540,160** | **2654** | **110** | **400** |
| EA1JO | * | 560,763 | 829 | 87 | 300 |
| EA1AEH | * | 402,040 | 928 | 60 | 170 |
| EA2AOI | * | 176,220 | 414 | 61 | 159 |
| EA5BY | * | 115,132 | 232 | 65 | 149 |
| EA1WX | * | 86,172 | 326 | 41 | 88 |
| EA5GIE | * | 6,588 | 113 | 17 | 37 |
| EA1DFP | * | 100 | 50 | 20 | 41 |
| **EA4ML** | **21** | **339,624** | **1216** | **34** | **125** |
| | | | (Op: UY7CW) | | |
| EA5HT | * | 285,450 | 1022 | 33 | 117 |
| **EA5FID** | **3.5** | **131,936** | **868** | **20** | **92** |
| EA7GSU | * | 37,400 | 373 | 16 | 72 |
| ***EA7RM** | **A** | **2,834,382** | **2560** | **109** | **420** |
| ***EA4DRV** | **"** | **1,686,995** | **2178** | **92** | **353** |
| ***EA1CXH** | **"** | **1,561,592** | **2060** | **96** | **328** |
| ***EA7WA** | **"** | **1,505,529** | **1957** | **93** | **316** |
| *EA7AJR | * | 1,210,890 | 1741 | 79 | 283 |
| *EA2BNU | * | 886,775 | 1250 | 87 | 308 |
| *EA1CS | * | 614,601 | 1068 | 84 | 267 |
| *EA2BDS | * | 367,470 | 753 | 68 | 202 |
| *EA7MT | * | 236,645 | 513 | 68 | 197 |
| *EA3AXM | * | 166,980 | 409 | 60 | 160 |
| *EA4BT | * | 136,850 | 375 | 60 | 170 |
| *EA1DGG | * | 130,150 | 383 | 48 | 142 |
| *EA5FW | * | 111,400 | 365 | 45 | 155 |
| *EA3NO | * | 101,606 | 253 | 60 | 142 |
| *EA5AIH | * | 88,160 | 312 | 47 | 113 |
| *EA3AEK | * | 83,332 | 280 | 50 | 116 |
| *EA1FF | * | 82,665 | 392 | 46 | 121 |
| *EA7CA | * | 81,624 | 270 | 49 | 103 |
| *EA5YN | * | 75,841 | 265 | 42 | 107 |
| *EA1VM | * | 59,330 | 192 | 53 | 117 |
| *EA4KG | * | 50,996 | 209 | 42 | 80 |
| *EA4AES | * | 41,448 | 203 | 37 | 95 |
| *EA7TG | * | 36,162 | 172 | 51 | 96 |
| *EA5BKV | * | 31,610 | 190 | 30 | 79 |
| *EA4AYX | * | 18,620 | 97 | 30 | 65 |
| *EA2AHZ | * | 15,197 | 93 | 38 | 53 |
| *EA5AKR | * | 13,104 | 110 | 32 | 52 |
| *EA7CWA | * | 8,260 | 61 | 27 | 43 |
| *EA4WD | * | 7,565 | 108 | 26 | 59 |
| *EA3CEC | * | 6,300 | 73 | 22 | 28 |
| *EA7FCX | * | 5,456 | 55 | 23 | 39 |
| *EA3GE | * | 2,769 | 84 | 20 | 51 |
| *EA7DIU | * | 2,599 | 76 | 11 | 12 |
| *EA3GIZ | * | 2,070 | 74 | 14 | 31 |
| *EA3DVJ | * | 1,271 | 46 | 11 | 30 |
| *EA5GFX | * | 1,204 | 31 | 17 | 26 |
| *EA3RE | * | 961 | 105 | 5 | 26 |
| *EC3ACF | * | 221 | 8 | 7 | 6 |
| *EA3OH | * | 100 | 20 | 12 | 13 |
| *EA3FM | * | 100 | 29 | 11 | 19 |
| ***EA7GYS** | **28** | **96,444** | **513** | **25** | **83** |
| *EA1EVA | * | 6,880 | 77 | 15 | 28 |
| ***EA1AK/7** | **21** | **281,850** | **1012** | **31** | **119** |
| ***EA2AZ** | **"** | **265,069** | **1169** | **31** | **102** |
| *EA7KJ | * | 150,297 | 711 | 26 | 93 |
| *EA4KR | * | 85,644 | 353 | 25 | 97 |
| *EA4EFJ | * | 22,724 | 206 | 15 | 37 |
| *EA1ND | 14 | 15,190 | 116 | 19 | 43 |
| *EA2AGS | 7 | 15,732 | 142 | 14 | 55 |
| *EA4DBM | * | 1,290 | 40 | 8 | 22 |
| | | SWEDEN | | | |
| **8S5A** | **A** | **2,867,113** | **2923** | **122** | **455** |
| | | | (Op: SM5AJV) | | |
| **7S2E** | **"** | **1,726,956** | **1946** | **120** | **414** |
| | | | (Op: SM2DMU) | | |
| SM5CLE | * | 980,745 | 1307 | 95 | 338 |
| SM5Q | * | 548,535 | 901 | 87 | 290 |
| | | | (Op: SM5AOE) | | |
| SM6WQB | * | 335,502 | 710 | 74 | 253 |
| SK3IK | * | 233,730 | 492 | 67 | 227 |
| SM6BGA | * | 68,376 | 285 | 44 | 110 |
| **SM5BEU** | **28** | **17,056** | **188** | **28** | **62** |
| **SLØW** | **21** | **352,836** | **988** | **33** | **129** |
| | | | (Op: SMØAJU) | | |
| SMØKV | * | 53,777 | 247 | 30 | 102 |
| **SM6E** | **7** | **153,875** | **863** | **29** | **96** |
| | | | (Op: SM6FUD) | | |
| 8S2F | * | 113,652 | 668 | 31 | 95 |
| | | | (Op: SM3WMV) | | |
| SK6HD | * | 40,067 | 259 | 23 | 80 |
| | | | (Op: SM6FKF) | | |
| SMØJ | * | 24,786 | 235 | 16 | 65 |
| | | | (Op: SMØDZH) | | |
| **SM5CEU** | **3.5** | **183,580** | **1012** | **30** | **104** |
| SM3CCT | * | 7,790 | 197 | 5 | 36 |
| SKØTM | * | 1,598 | 33 | 6 | 28 |
| | | | (Op: SM5COP) | | |
| ***SM3X** | **A** | **841,940** | **1250** | **92** | **338** |
| | | | (Op: SM3CVM) | | |
| ***SM6D** | **"** | **688,644** | **1030** | **94** | **329** |
| | | | (Op: SM6DER) | | |
| *8SØF | * | 497,904 | 1105 | 66 | 262 |
| | | | (Op: SMØOGQ) | | |
| *SM2KAL | * | 490,768 | 1177 | 69 | 227 |
| *SM7EH | * | 387,376 | 806 | 68 | 273 |
| *SM3EAE | * | 327,825 | 792 | 65 | 214 |
| *SM7BJW | * | 303,840 | 593 | 68 | 220 |
| *SMØBDS | * | 255,789 | 480 | 71 | 220 |
| *SM2JEB | * | 247,860 | 553 | 60 | 183 |
| *SM6NET | * | 247,638 | 577 | 60 | 217 |
| *SM5BAX | * | 154,086 | 524 | 43 | 140 |
| *SM3AVW | * | 147,062 | 396 | 58 | 220 |
| *SMØWRA | * | 141,912 | 342 | 59 | 157 |
| *SM7BVO | * | 108,398 | 344 | 41 | 125 |
| *SM5RE | * | 71,020 | 312 | 44 | 116 |
| *SM7CWI | * | 65,876 | 237 | 45 | 127 |
| *SM6XKB | * | 42,670 | 392 | 43 | 127 |
| *SM4XIH | * | 37,950 | 166 | 44 | 121 |
| *SM7BQX | * | 36,208 | 198 | 35 | 89 |
| *SM7ATL | * | 35,700 | 202 | 24 | 81 |
| *8SØW | * | 34,104 | 122 | 51 | 96 |
| | | | (Op: SMØNJO) | | |
| *SM7GCZ | * | 28,322 | 118 | 42 | 116 |
| *SM6BZE | * | 10,725 | 89 | 23 | 52 |
| *SM6DUA | * | 10,126 | 104 | 35 | 87 |
| *SMØV | * | 9,898 | 84 | 31 | 67 |
| | | | (Op: SMØELV) | | |
| *SMØY | * | 5,544 | 57 | 17 | 27 |
| *SM4TU | * | 3,698 | 43 | 18 | 25 |
| *SM5BTX | * | 301 | 32 | 16 | 27 |
| *SM7DIE | 28 | 5,320 | 52 | 14 | 26 |
| *SL5ZXR | * | 480 | 11 | 6 | 10 |
| ***SM7CIL** | **21** | **132,392** | **387** | **33** | **119** |
| *SMØGRD | * | 67,600 | 337 | 25 | 79 |
| ***7S7V** | **7** | **105,609** | **780** | **21** | **86** |
| | | | (Op: SM7VZX) | | |
| *8S6A | * | 20,864 | 267 | 12 | 52 |
| | | | (Op: SM6DPF) | | |
| ***SM7X** | **1.8** | **12,152** | **249** | **6** | **43** |
| | | SWITZERLAND | | | |
| **HB9CZF** | **A** | **1,463,000** | **1591** | **113** | **387** |
| HB9FAP | * | 257,810 | 1033 | 32 | 113 |
| HB9HFM | * | 45,408 | 202 | 44 | 88 |
| **HB9BOU** | **21** | **138,052** | **523** | **29** | **93** |
| ***HB9ARF** | **A** | **1,374,217** | **1614** | **97** | **384** |
| *HB9DOT | * | 702,236 | 1162 | 77 | 314 |
| *HB9DCM | * | 637,112 | 907 | 88 | 279 |
| *HB9DOZ | * | 6,596 | 75 | 26 | 42 |
| *HB9CPS | 28 | 13,166 | 123 | 19 | 39 |
| ***HB9CBR** | **14** | **65,625** | **417** | **21** | **84** |
| | | UKRAINE | | | |
| **UX5UO** | **A** | **1,724,540** | **2011** | **122** | **407** |
| **UT2UB** | **"** | **1,208,172** | **1582** | **119** | **413** |
| **UV5U** | **"** | **1,181,943** | **1404** | **112** | **399** |
| | | | (Op: UX1UA) | | |
| US4EX | * | 396,126 | 663 | 83 | 271 |
| UW7M | * | 354,244 | 769 | 80 | 252 |
| | | | (Op: UR3MP) | | |
| UT5ECZ | * | 157,548 | 512 | 48 | 180 |
| UU5YL | * | 48,246 | 347 | 32 | 70 |
| UT3EK | * | 15,504 | 162 | 17 | 51 |
| UR7EU | * | 3,300 | 27 | 18 | 26 |
| **UT1IA** | **28** | **201,345** | **731** | **32** | **123** |
| UT5IZ | * | 120,696 | 786 | 27 | 80 |
| **UT2IY** | **21** | **338,520** | **1328** | **35** | **120** |
| UX3HA | * | 23,409 | 322 | 20 | 61 |
| **UY5ZZ** | **14** | **243,750** | **1110** | **32** | **118** |
| UT2AU | * | 73,509 | 437 | 24 | 83 |
| UU1JO | * | 5,880 | 68 | 10 | 46 |
| **UZ8M** | **7** | **336,306** | **1524** | **34** | **104** |
| | | | (Op: USØMR) | | |
| UT4EK | * | 66,462 | 435 | 22 | 84 |
| **UT5UGR** | **3.5** | **205,524** | **1227** | **26** | **106** |
| **UXØFF** | **"** | **135,355** | **1258** | **22** | **93** |
| UT5UIA | * | 81,477 | 725 | 21 | 78 |
| UR5IOK | * | 72,030 | 555 | 21 | 84 |
| UYØZG | * | 67,116 | 584 | 15 | 79 |
| US9PA | * | 58,052 | 547 | 17 | 75 |
| US2WU | * | 38,900 | 544 | 18 | 82 |
| UX1VT | * | 29,532 | 398 | 10 | 59 |
| UY2RO | * | 29,100 | 347 | 12 | 63 |
| UR7EQ | * | 16,646 | 258 | 9 | 49 |
| USØOG | 1.8 | 748 | 36 | 4 | 18 |
| ***UR3HC** | **A** | **1,402,126** | **1768** | **111** | **395** |
| *UY5TE | * | 530,330 | 1076 | 72 | 290 |
| *UY3QW | * | 426,790 | 1073 | 65 | 270 |
| *UY5ZI | * | 418,658 | 704 | 86 | 267 |
| *UR6QS | * | 378,021 | 734 | 82 | 247 |
| *UY1M | * | 306,588 | 683 | 77 | 271 |
| | | | (Op: UR9MM) | | |
| *UX1HW | * | 296,180 | 610 | 69 | 226 |
| *UR5GFO | * | 273,661 | 718 | 63 | 220 |
| *US5II | * | 260,246 | 504 | 99 | 307 |
| *US5MTJ | * | 237,312 | 876 | 69 | 240 |
| *UY7C | * | 227,664 | 555 | 58 | 190 |
| | | | (Op: UR3CMA) | | |
| *UT5UJY | * | 206,176 | 648 | 54 | 218 |
| *UT5UML | * | 147,798 | 334 | 61 | 177 |
| *UU2JA | * | 129,241 | 233 | 76 | 183 |
| *UX9IO | * | 98,126 | 795 | 65 | 236 |
| *UT4EO | * | 86,718 | 250 | 58 | 136 |
| *UT2QQ | * | 82,410 | 284 | 53 | 148 |
| *UU9CW | * | 78,330 | 159 | 79 | 131 |
| *UT1IR | * | 68,392 | 203 | 52 | 114 |
| *UR3PA | * | 34,314 | 140 | 31 | 83 |
| *UX1IB | * | 12,838 | 106 | 30 | 68 |
| *UR5EU | * | 11,808 | 110 | 21 | 61 |
| *UU9JQ | * | 8,277 | 100 | 23 | 66 |
| *UR5HAC | * | 1,886 | 21 | 20 | 21 |
| ***UT2UZ** | **28** | **98,496** | **306** | **31** | **121** |
| *US6IMA | * | 20,320 | 160 | 24 | 56 |
| *UY7LM | * | 8,400 | 88 | 18 | 38 |
| *UT5JAB | * | 100 | 36 | 8 | 18 |
| ***UW8M** | **21** | **346,788** | **1308** | **35** | **121** |
| | | | (Op: UR5MID) | | |
| *US7IGF | * | 229,437 | 815 | 32 | 127 |
| *UR6IJ | * | 226,044 | 788 | 33 | 128 |
| *UX5EF | * | 87,880 | 395 | 28 | 102 |
| *UTØH | * | 29,000 | 190 | 22 | 78 |
| *UWØF | * | 22,359 | 164 | 23 | 64 |
| | | | (Op: UX5HY) | | |
| ***UX7QD** | **14** | **83,552** | **488** | **26** | **86** |
| ***UT8LO** | **"** | **82,096** | **610** | **28** | **84** |
| *UT3QT | * | 41,600 | 305 | 25 | 75 |
| *UY5WA | * | 27,722 | 283 | 16 | 62 |
| *UY5YA | * | 24,843 | 194 | 19 | 72 |
| ***UT1FA** | **7** | **247,940** | **1151** | **31** | **109** |
| *UW5U | * | 183,816 | 994 | 28 | 110 |
| | | | (Op: UY2UA) | | |
| *UT4PZ | * | 100,920 | 619 | 23 | 93 |
| *UW2F | * | 67,680 | 560 | 18 | 78 |
| | | | (Op: UTØFT) | | |
| *UR7QM | * | 51,030 | 392 | 20 | 70 |
| ***UR5IDP** | **1.8** | **28,480** | **403** | **9** | **55** |
| ***UX5NQ** | **"** | **28,288** | **490** | **9** | **55** |
| *UX2MF | * | 18,526 | 279 | 9 | 50 |
| *UT8IT | * | 4,329 | 115 | 5 | 34 |
| *UR4III | * | 777 | 38 | 5 | 16 |
| | | WALES | | | |
| **MW5A** | **A** | **4,633,299** | **4071** | **123** | **438** |
| | | | (Op: G3WVG) | | |
| GWØGEI | * | 786,048 | 1406 | 90 | 278 |
| **GW7X** | **7** | **305,488** | **1748** | **23** | **99** |
| | | | (Op: GW3NJW) | | |
| ***GW8K** | **A** | **1,098,804** | **2052** | **80** | **301** |
| | | | (Op: GW4BVJ) | | |
| *GW4MVA | * | 571,144 | 865 | 80 | 296 |
| *MW3OKA | * | 19,500 | 186 | 19 | 59 |
| | | YUGOSLAVIA | | | |
| **YT6A** | **A** | **4,604,818** | **3702** | **154** | **573** |
| **YZ1U** | **28** | **310,095** | **1059** | **34** | **101** |
| | | | (Op: YU1WS) | | |
| **YT9X** | **21** | **534,803** | **1813** | **36** | **127** |
| | | | (Op: YU1ZZ) | | |
| YU7KWX | * | 267,540 | 1084 | 34 | 113 |
| **YT1BB** | **14** | **280,794** | **1587** | **35** | **124** |
| YU7CF | * | 268,710 | 1323 | 31 | 99 |
| **YT7A** | **7** | **678,456** | **2382** | **35** | **127** |
| | | | (Op: YU7GW) | | |
| **YTØA** | **3.5** | **218,025** | **1275** | **30** | **105** |
| **YU7AV** | **"** | **176,700** | **1186** | **27** | **97** |
| YTØT | * | 85,344 | 1047 | 16 | 80 |
| | | | (Op: YZ1ZV) | | |
| YZ1SG | * | 81,855 | 889 | 14 | 71 |
| YU1CC | * | 38,298 | 489 | 12 | 66 |
| YU1KT | * | 3,306 | 99 | 7 | 31 |
| ***YZ1EW** | **A** | **1,242,072** | **1478** | **95** | **373** |
| ***YT7AW** | **"** | **1,032,954** | **1134** | **120** | **413** |
| *YT1LT | * | 682,290 | 1330 | 87 | 274 |
| *YU1EQ | * | 558,298 | 969 | 84 | 310 |
| *YT1NP | * | 543,711 | 887 | 78 | 279 |
| *YT1AT | * | 265,540 | 552 | 71 | 213 |
| *YU1PJ | * | 181,424 | 497 | 57 | 175 |
| *YU7AM | * | 163,812 | 434 | 55 | 164 |
| *YU1JF | * | 60,112 | 163 | 30 | 81 |
| ***4N7N** | **28** | **259,444** | **814** | **32** | **116** |
| | | | (Op: YU7WW) | | |
| *YU7YZ | * | 51,150 | 244 | 26 | 67 |
| ***YZ1AU** | **21** | **426,184** | **1346** | **36** | **131** |
| | | | (Op: YU1EA) | | |
| ***YU7BJ** | **14** | **212,040** | **1019** | **32** | **92** |
| *YZ1KA | * | 194,040 | 1122 | 28 | 92 |
| *YT9M | * | 122,280 | 795 | 26 | 94 |
| *YT7DQ | * | 90,825 | 742 | 25 | 80 |
| ***4N1FG** | **7** | **216,945** | **1120** | **28** | **107** |
| *YU7HC | * | 40,040 | 320 | 18 | 70 |
| ***YZ7A** | **1.8** | **51,900** | **732** | **11** | **54** |
| | | | (Op: YU7CM) | | |
| | | MARITIME MOBILE | | | |
| ***MM/SP2AVE** | **28** | **93,280** | **298** | **47** | **129** |
| | | OCEANIA | | | |
| | | AUSTRALIA | | | |
| **VK5GN** | **A** | **907,392** | **1269** | **88** | **190** |
| VK6LW | * | 116,494 | 424 | 32 | 74 |
| VK5WU | * | 62,186 | 195 | 39 | 79 |
| VK2KM | * | 55,476 | 179 | 40 | 94 |
| **VK4UC** | **28** | **251,368** | **955** | **29** | **75** |
| **VK4EMM** | **21** | **886,103** | **2112** | **36** | **113** |
| **VK4XY** | **3.5** | **11,835** | **116** | **20** | **25** |
| **VK6VZ** | **1.8** | **2,666** | **34** | **12** | **19** |
| ***VK2DPD** | **A** | **288,537** | **500** | **89** | **180** |
| *VK4UH | * | 71,016 | 242 | 45 | 87 |
| *VK2GR | * | 70,231 | 246 | 56 | 71 |
| *VK3DBQ | * | 28,320 | 169 | 51 | 69 |
| ***VK4TT** | **28** | **151,368** | **664** | **28** | **56** |
| *VK2CZ | * | 1,824 | 26 | 10 | 14 |
| ***VK4DX** | **14** | **477,432** | **1123** | **34** | **118** |
| *VK2AR | * | 42,372 | 203 | 27 | 72 |
| | | BELAU | | | |
| **T88JA** | **A** | **3,133,220** | **3051** | **123** | **287** |
| | | | (Op: JA6VZB) | | |
| | | BRUNEI | | | |
| V8YYY | 1.8 | 1,980 | 56 | 6 | 6 |
| | | | (Op: JR3WXA) | | |
| | | EAST MALAYSIA | | | |
| **9M6NA** | **21** | **1,043,526** | **2251** | **36** | **127** |
| | | | (Op: JE1JKL) | | |
| *9M6JU | A | 50,592 | 169 | 54 | 70 |
| | | | (Op: JA1RJU) | | |
| | | HAWAII | | | |
| KH6/K1ER | A | 8,890 | 48 | 33 | 37 |
| ***KH6/VA7CW** | **A** | **443,190** | **1019** | **76** | **94** |
| *AH6RI | 14 | 10 | 10 | 1 | 2 |
| | | INDONESIA | | | |
| **YB2EMK** | **28** | **24,252** | **137** | **25** | **61** |
| **YC2DGR** | **21** | **29,640** | **151** | **23** | **55** |
| ***YBØECT** | **A** | **1,465,310** | **1697** | **107** | **278** |
| *YBØDPO | * | 646,912 | 963 | 73 | 183 |
| *YB2LSR | * | 51,508 | 133 | 62 | 101 |
| ***YB7VCW** | **21** | **51,578** | **277** | **25** | **49** |
| *YD3JMO | * | 2,088 | 38 | 10 | 19 |
| | | NEW ZEALAND | | | |
| **ZL1GO** | **A** | **2,117,575** | **2151** | **120** | **235** |
| ZL1ALZ | * | 148,016 | 454 | 41 | 75 |
| ***ZL2BR** | **A** | **1,029,845** | **1279** | **90** | **205** |
| *ZL1AIH | * | 157,108 | 324 | 74 | 107 |
| | | OGASAWARA ISLANDS | | | |
| **8N1OGA** | **A** | **1,271,160** | **2014** | **97** | **224** |
| | | | (Op: JD1AMA) | | |
| | | NORTHERN MARIANAS | | | |
| **WHØV** | **7** | **80,850** | **411** | **24** | **51** |
| ***KHØ/JK2VOC** | **A** | **2,069,083** | **2363** | **109** | **202** |
| | | PHILIPPINES | | | |
| **4G1A** | **A** | **3,080,825** | **2575** | **133** | **292** |
| | | | (Op: N2NL) | | |
| DU3NXE | * | 143,530 | 339 | 60 | 95 |
| | | SOUTH AMERICA | | | |
| | | ANTARCTICA | | | |
| **R1ANZ** | **A** | **272,960** | **703** | **56** | **104** |
| ***R1ANC** | **14** | **60,724** | **289** | **25** | **51** |
| | | | (Op: UA1PAC) | | |
| | | ARGENTINA | | | |
| **LO7H** | **A** | **1,466,510** | **2345** | **85** | **180** |
| | | | (Op: LU7HN) | | |
| LU5FA | * | 521,026 | 2048 | 27 | 94 |
| **LU7YS** | **21** | **67,956** | **302** | **26** | **58** |
| **LU4FM** | **14** | **850,640** | **2013** | **36** | **119** |
| | | | (Op: LW9DA) | | |
| ***LU5BB** | **A** | **1,329,012** | **1990** | **78** | **183** |
| *LU1EWL | * | 689,811 | 1267 | 80 | 147 |
| *LU2AS | * | 210,450 | 621 | 57 | 81 |
| *LU1FZR | * | 164,346 | 773 | 30 | 68 |
| *LU4HKN | * | 20,020 | 118 | 31 | 46 |
| ***LU8DW** | **28** | **516,648** | **1482** | **30** | **102** |
| ***LW7DX** | **"** | **454,450** | **1478** | **28** | **94** |
| *LU7DNN | * | 254,736 | 741 | 30 | 92 |
| *LW2EU | * | 16,749 | 94 | 20 | 56 |
| *LS2DX | * | 14,532 | 137 | 15 | 27 |
| | | | (Op: LW2DX) | | |
| ***LS9EOC** | **21** | **373,564** | **1395** | **33** | **89** |
| ***AY5FZ** | **"** | **290,719** | **1095** | **28** | **79** |
| | | | (Op: LU5FZ) | | |
| *LU8HZ | * | 45,520 | 248 | 21 | 59 |
| *LU3EAW | * | 22,971 | 252 | 18 | 21 |
| *LW5EE | 14 | 4,250 | 70 | 16 | 34 |
| | | ARUBA | | | |
| **P4ØE** | **A** | **14,251,216** | **7026** | **161** | **563** |
| | | | (Op: CT1BOH) | | |
| **P4ØQ** | **"** | **11,191,146** | **6448** | **144** | **473** |
| | | | (Op: KØDQ) | | |
| **P4ØW** | **"** | **10,076,400** | **5889** | **145** | **477** |
| | | | (Op: W2GD) | | |
| **P4ØJ** | **7** | **910,315** | **2344** | **33** | **122** |
| | | | (Op: WX4G) | | |
| | | BRAZIL | | | |
| PY3MT | A | 6,930 | 50 | 29 | 34 |
| **PX2W** | **28** | **1,794,338** | **3503** | **38** | **144** |
| | | | (Op: PY2YU) | | |
| **PY2NDX** | **21** | **977,796** | **1993** | **35** | **138** |
| **PY2NY** | **14** | **852,720** | **2095** | **34** | **118** |
| **PV8DX** | **7** | **394,940** | **1077** | **29** | **101** |
| PR7AR | 3.5 | 138 | 24 | 11 | 12 |
| **PY1BVY** | **1.8** | **1,847** | **26** | **13** | **21** |
| ***PY7ZY** | **A** | **1,359,270** | **1539** | **89** | **241** |
| ***PY2NA** | **"** | **1,216,593** | **1679** | **83** | **204** |
| *PY5BLG | * | 455,700 | 904 | 64 | 132 |
| *PY7IQ | * | 298,350 | 509 | 58 | 163 |
| *PY4FQ | * | 266,570 | 491 | 71 | 159 |
| *PY3OL | * | 229,326 | 477 | 67 | 155 |
| *PP7ZZ | * | 204,568 | 515 | 59 | 123 |
| *PY2ZI | * | 200,734 | 446 | 46 | 121 |
| *PY3FBI | * | 110,107 | 423 | 34 | 69 |
| *PR7AB | * | 81,180 | 528 | 41 | 91 |
| *PU7EEL | * | 32,966 | 227 | 35 | 71 |
| *PY7OJ | * | 21,828 | 83 | 38 | 64 |
| *PY3NH | * | 10,934 | 134 | 29 | 42 |
| *PR7FN | * | 4,800 | 61 | 23 | 37 |
| *PP7CW | * | 2,800 | 35 | 17 | 23 |
| *PY4CEL | * | 2,016 | 47 | 16 | 20 |
| *PY3CAL | * | 224 | 12 | 8 | 8 |
| ***PY3CQ** | **28** | **294,624** | **994** | **28** | **96** |
| *PY2FRW | * | 161 | 18 | 8 | 15 |
| *PU3GTF | * | 100 | 12 | 7 | 6 |
| *PY3GAD | * | 100 | 79 | 15 | 24 |
| *PR7BW | * | 98 | 16 | 6 | 8 |
| ***PP2RON** | **21** | **46,292** | **261** | **20** | **51** |
| *PR7FB | * | 42,218 | 197 | 25 | 76 |
| *PY2RH | * | 28,556 | 250 | 15 | 29 |
| *PY2APQ | * | 15,992 | 126 | 21 | 35 |
| *PR7NJ | * | 1,677 | 55 | 14 | 25 |
| ***ZZ8Z** | **14** | **142,200** | **835** | **19** | **71** |
| | | | (Op: PY8AZT) | | |
| *PY5XT | 7 | 100 | 182 | 19 | 49 |
| | | CHILE | | | |
| **3G1X** | **A** | **1,717,650** | **2071** | **93** | **254** |
| ***XQ1ZW** | **A** | **1,151,376** | **1499** | **94** | **195** |
| | | NETHERLANDS ANTILLES | | | |
| ***PJ4W** | **A** | **6,792,895** | **4521** | **125** | **410** |
| | | | (Op: DL1EFD) | | |
| | | PERU | | | |
| **OA4SS** | **A** | **1,538,110** | **1858** | **103** | **198** |
| **OA4WW** | **7** | **853,078** | **2166** | **33** | **113** |
| *DA7/DF8AN | A | 15,480 | 113 | 30 | 60 |
| | | SOUTH SHETLAND ISLANDS | | | |
| ***LZ8A** | **A** | **910,068** | **1461** | **106** | **256** |
| | | URUGUAY | | | |
| **CX5BW** | **28** | **1,169,430** | **2924** | **34** | **136** |
| ***CX9AU** | **A** | **2,053,130** | **2108** | **104** | **254** |
| ***CW4A** | **28** | **1,270,773** | **2832** | **33** | **128** |
| | | | (Op: CX5AO) | | |
| ***CX7BY** | **21** | **322,940** | **880** | **37** | **97** |
| | | VENEZUELA | | | |
| **YW1D** | **7** | **757,846** | **2126** | **34** | **133** |
| | | | (Op: YV1DIG) | | |
| *YV5NWG | A | 4,760 | 42 | 28 | 42 |
| ***YV7QP** | **28** | **72,240** | **428** | **22** | **62** |
| ***YV6AZC** | **21**

| | | | | | |
|---|---|---|---|---|---|
| RZ9IB | * | 172,020 | 452 | 49 | 134 |
| **PA0ADT** | * | **163,755** | **460** | **50** | **168** |
| G4DDX | * | 158,840 | 483 | 47 | 162 |
| UX8IX | * | 157,722 | 569 | 68 | 203 |
| W8VE | * | 157,300 | 299 | 65 | 155 |
| N8IE | * | 146,376 | 273 | 63 | 165 |
| RV9COI | * | 134,787 | 313 | 48 | 131 |
| AA1CA | * | 111,925 | 233 | 53 | 132 |
| **ON7CC** | * | **106,375** | **398** | **50** | **135** |
| EA1GT | * | 99,384 | 372 | 43 | 121 |
| **YO4AAC** | * | **95,500** | **291** | **48** | **143** |
| RP4ASB | * | 91,010 | 404 | 40 | 150 |
| | | | (Op: RV4AQ) | | |
| **F5CBQ** | * | **90,582** | **401** | **44** | **142** |
| SM0HPL | * | 88,896 | 327 | 45 | 147 |
| SP3BLT | * | 88,146 | 327 | 41 | 125 |
| **GM4HOF** | * | **85,680** | **317** | **34** | **86** |
| SP9IBJ | * | 83,817 | 290 | 48 | 153 |
| G4AFU | * | 80,660 | 306 | 41 | 107 |
| SM5DQ | * | 80,640 | 290 | 48 | 176 |
| WB6BWZ/4 | * | 74,476 | 197 | 57 | 115 |
| F8BDQ | * | 72,480 | 340 | 38 | 113 |
| W6RCL | * | 63,650 | 188 | 59 | 75 |
| **LA7SI** | * | **63,070** | **280** | **38** | **132** |
| DL1ARJ | * | 56,544 | 278 | 44 | 108 |
| HB9/VA3SB | * | 52,197 | 251 | 37 | 90 |
| K4FB | * | 50,544 | 152 | 46 | 110 |
| US0YA | * | 46,508 | 119 | 55 | 99 |
| **N2JNZ** | * | **45,353** | **151** | **37** | **96** |
| G0NIG | * | 43,792 | 249 | 29 | 90 |
| HB9DCL | * | 40,320 | 254 | 43 | 97 |
| **NQ7X** | * | **40,278** | **173** | **57** | **90** |
| F5VBT | * | 38,766 | 276 | 28 | 114 |
| **LZ4AE** | * | **38,514** | **187** | **36** | **95** |
| F5IQJ | * | 37,772 | 284 | 28 | 105 |
| PA1MW | * | 37,200 | 244 | 30 | 90 |
| **L55DR** | * | **34,668** | **159** | **43** | **65** |
| | | | (Op: LW5DR) | | |
| MM3BRR | * | 34,126 | 159 | 34 | 117 |
| DL7AXM | * | 32,718 | 152 | 23 | 100 |
| DK4CU | * | 32,240 | 215 | 28 | 96 |
| K4BX | * | 31,611 | 103 | 44 | 79 |
| VE3WZ | * | 30,625 | 102 | 43 | 82 |
| ON5PV | * | 28,798 | 191 | 34 | 85 |
| JN2FSE | * | 26,429 | 108 | 46 | 61 |
| JA2DNA | * | 25,500 | 147 | 32 | 53 |
| KØUE | * | 23,387 | 117 | 38 | 53 |
| **OZ6XR** | * | **23,280** | **199** | **32** | **88** |
| **OE1AZU** | * | **20,979** | **137** | **37** | **74** |
| DL2WRJ | * | 19,380 | 162 | 29 | 85 |
| KØKL | * | 18,564 | 118 | 33 | 35 |
| W2BVH | * | 17,115 | 88 | 37 | 68 |
| DL6UAM | * | 16,756 | 152 | 16 | 43 |
| **T94DM** | * | **15,747** | **156** | **21** | **66** |
| K4GT | * | 15,066 | 75 | 38 | 55 |
| JK8NLB | * | 14,892 | 90 | 25 | 43 |
| F5NLX | * | 13,888 | 123 | 21 | 43 |
| **6Y1A** | * | **12,354** | **108** | **21** | **37** |
| | | | (Op: W6NS) | | |
| JA1GTF | * | 12,320 | 87 | 35 | 45 |
| W4DEC | * | 11,771 | 64 | 35 | 44 |
| KC8LTL | * | 10,296 | 66 | 29 | 37 |
| F5LBG | * | 9,207 | 130 | 29 | 70 |
| KIØG | * | 8,844 | 161 | 53 | 81 |
| VE6BF | * | 8,712 | 53 | 27 | 45 |
| DL2BOD | * | 8,502 | 77 | 20 | 58 |
| S51RE | * | 6,667 | 47 | 25 | 34 |
| DJ5QK | * | 5,688 | 80 | 20 | 52 |
| VA7MM | * | 5,593 | 66 | 26 | 21 |
| OK1DMP | * | 4,794 | 37 | 18 | 33 |
| XE2/EA5XQ | * | 3,422 | 61 | 15 | 14 |
| N8KV | * | 3,186 | 34 | 23 | 31 |
| VE3SYB | * | 3,159 | 53 | 19 | 20 |
| AI2P/3 | * | 2,940 | 31 | 17 | 25 |
| PA3FSC | * | 2,184 | 55 | 16 | 36 |
| W9HL | * | 2,124 | 23 | 15 | 21 |
| W2JEK | * | 1,891 | 47 | 27 | 34 |
| EA7AAW | * | 1,806 | 55 | 8 | 6 |
| PAØRBO | * | 1,440 | 44 | 15 | 33 |
| KD9B/4 | * | 1,386 | 19 | 14 | 19 |
| WB9MII | * | 1,088 | 26 | 15 | 19 |
| E20NTS | * | 476 | 16 | 12 | 16 |
| UA6ATG | * | 416 | 19 | 5 | 11 |
| 7N3KVN | * | 154 | 8 | 7 | 7 |
| VK3JS | * | 100 | 30 | 26 | 20 |
| AE4EC | * | 100 | 25 | 16 | 18 |
| WB9III | * | 1,000 | 100 | 10 | 14 |
| **EA5GX** | 28 | **170,550** | **529** | **31** | **119** |
| **JG2MLI** | * | **137,709** | **508** | **32** | **75** |
| **VE5UF** | * | **134,330** | **626** | **26** | **75** |
| **YO8WW** | * | **125,704** | **580** | **35** | **117** |
| **JR3RWB** | * | **123,050** | **450** | **32** | **75** |
| **UN7CN** | * | **111,066** | **408** | **25** | **82** |
| **CT1ETE** | * | **107,642** | **508** | **22** | **85** |
| **KG9X** | * | **90,220** | **268** | **28** | **102** |
| **JA9XBW** | * | **83,030** | **321** | **32** | **63** |
| **ES1CW** | * | **80,352** | **316** | **29** | **95** |
| **PA3ELD** | * | **54,296** | **265** | **22** | **66** |
| **RZ6BU** | * | **49,950** | **293** | **26** | **64** |
| **XR3A** | * | **47,439** | **294** | **22** | **41** |
| | | | (Op: CE3DNP) | | |
| **GI0KVQ** | * | **40,528** | **356** | **18** | **50** |
| **DL5MBY** | * | **40,128** | **225** | **19** | **69** |
| **PY1KS** | * | **36,582** | **180** | **25** | **53** |
| **EW6DX** | * | **32,865** | **137** | **28** | **77** |
| **WA6FGV** | * | **32,777** | **160** | **25** | **48** |
| **MØO** | * | **30,418** | **228** | **19** | **48** |
| | | | (Op: G4JZO) | | |
| EA2CAR | * | 29,406 | 179 | 23 | 55 |
| **SP7BCA** | * | **22,287** | **144** | **22** | **47** |
| **UR5FCM** | * | **21,641** | **157** | **20** | **47** |
| **LA6PB** | * | **18,848** | **161** | **17** | **45** |
| **K3SWZ** | * | **17,040** | **97** | **21** | **50** |
| **JA1EM** | * | **15,712** | **133** | **18** | **33** |
| VE3UKR | * | 15,080 | 97 | 14 | 51 |
| K4JSI | * | 14,008 | 82 | 16 | 52 |
| OH2JXA | * | 13,320 | 131 | 16 | 44 |
| K7GS | * | 12,985 | 97 | 21 | 32 |
| KQ1V | * | 12,104 | 94 | 17 | 51 |
| JR2TMB | * | 10,277 | 87 | 17 | 26 |
| HB9AFH | * | 6,868 | 53 | 22 | 46 |
| DL2OT | * | 5,984 | 117 | 13 | 21 |
| OK1AIJ | * | 4,725 | 62 | 15 | 20 |
| LA4TKA | * | 2,706 | 49 | 10 | 23 |
| EA1BP | * | 825 | 34 | 7 | 8 |
| K6MI | * | 117 | 7 | 6 | 7 |
| **6Y9A** | 21 | **238,800** | **1325** | **26** | **74** |
| | | | (Op: N6XG) | | |
| **KR2Q** | * | **237,523** | **561** | **31** | **120** |
| **OK2VWB** | * | **156,128** | **501** | **32** | **104** |
| **SP5DDJ** | * | **153,990** | **482** | **30** | **115** |
| **JQ1NGT** | * | **117,513** | **507** | **28** | **71** |
| **SM5GNS** | * | **108,855** | **446** | **29** | **94** |
| | | | (Op: SMØGNS) | | |
| **7K4QOK** | * | **106,193** | **414** | **30** | **73** |
| | | | (Op: JR2BNF) | | |
| **YR5A** | * | **105,492** | **584** | **28** | **90** |
| | | | (Op: YO5OHO) | | |
| **DL6MHW** | * | **104,394** | **409** | **28** | **99** |
| SP4GFG | * | 92,619 | 366 | 28 | 95 |
| **ZS6DX** | * | **91,086** | **355** | **25** | **89** |
| **I1BAY** | * | **84,480** | **502** | **28** | **100** |
| **9A3GU** | * | **64,944** | **367** | **26** | **73** |
| **US9QA** | * | **60,170** | **275** | **27** | **83** |
| **ES1CR** | * | **53,848** | **305** | **26** | **80** |
| **G2HLU** | * | **37,380** | **260** | **22** | **67** |
| **PAØJED** | * | **15,675** | **127** | **17** | **40** |
| JJ1IVX | * | 13,300 | 97 | 21 | 29 |
| SP8AQA | * | 12,804 | 153 | 18 | 48 |
| **TF3MA** | * | **12,480** | **125** | **17** | **48** |
| **GMØLVI** | * | **11,651** | **127** | **16** | **45** |
| **RW9RW** | * | **10,783** | **118** | **7** | **34** |
| OZ7BQ | * | 9,570 | 81 | 15 | 40 |
| RV3DBK | * | 3,977 | 62 | 8 | 33 |
| JA7JNF | * | 3,700 | 48 | 15 | 22 |
| JA1IXI | * | 2,870 | 48 | 18 | 23 |
| EC3CJN | * | 2,016 | 46 | 9 | 27 |
| JO7EGJ/1 | * | 532 | 16 | 7 | 12 |
| **6Y2A** | 14 | **364,378** | **1490** | **28** | **91** |
| | | | (Op: KE7X) | | |
| **KH6/W8QZA** | * | **129,500** | **453** | **32** | **68** |
| **SM3C** | * | **118,400** | **549** | **27** | **101** |
| | | | (Op: SM5CCT) | | |
| **G3LHJ** | * | **77,164** | **491** | **22** | **79** |
| **OK1IF** | * | **70,200** | **467** | **23** | **81** |
| **FM5CW** | * | **36,024** | **197** | **19** | **60** |
| **US3QW** | * | **34,443** | **291** | **20** | **69** |
| **DL9NEI** | * | **23,100** | **242** | **16** | **59** |
| **LA8WG** | * | **21,301** | **251** | **16** | **59** |
| **K4NVJ** | * | **19,684** | **101** | **22** | **52** |
| **EA6BB** | * | **16,072** | **228** | **19** | **63** |
| **LU7HHE** | * | **12,246** | **142** | **14** | **25** |
| SM5API | * | 10,974 | 119 | 16 | 46 |
| **VE3IGJ** | * | **9,061** | **133** | **17** | **24** |
| N5LI | * | 3,936 | 37 | 15 | 26 |
| ON7SS | * | 3,872 | 93 | 8 | 36 |
| SM6AHU | * | 2,232 | 61 | 8 | 28 |
| HB9LDO | * | 1,650 | 33 | 8 | 22 |
| RN3QR | * | 1,419 | 63 | 8 | 35 |
| W5EB | * | 1,305 | 22 | 11 | 18 |
| JA6LAD | * | 504 | 18 | 9 | 12 |
| LU2DGZ | * | 208 | 11 | 8 | 8 |
| **6Y4A** | 7 | **402,930** | **1516** | **26** | **95** |
| | | | (Op: K2KW) | | |
| **RU6FA** | * | **55,539** | **391** | **22** | **77** |
| **RX6LDK** | * | **51,800** | **415** | **20** | **80** |
| **OH7FF** | * | **45,172** | **316** | **20** | **72** |
| **OK1IR** | * | **38,359** | **317** | **15** | **74** |
| **I3MLU** | * | **26,149** | **255** | **16** | **63** |
| **IZ1DFI** | * | **25,840** | **304** | **14** | **66** |
| **RZ6HX** | * | **20,301** | **291** | **21** | **80** |
| **T94DO** | * | **19,520** | **363** | **13** | **51** |
| OK2BJL | * | 16,215 | 181 | 14 | 55 |
| HB9CEY | * | 11,424 | 116 | 14 | 54 |
| N2UM/4 | * | 6,525 | 60 | 11 | 34 |
| SM2EKA | * | 1,891 | 49 | 7 | 24 |
| OK2GG | * | 400 | 11 | 7 | 9 |
| K7MM | * | 234 | 7 | 7 | 6 |
| OZ1BXM | * | 48 | 6 | 2 | 6 |
| **K3TW** | 3.5 | **2,916** | **47** | **11** | **25** |
| **6Y0A** | 1.8 | **27,824** | **454** | **11** | **26** |
| | | | (Op: W7CB) | | |
| **YU1RA** | * | **17,360** | **273** | **8** | **54** |
| **SP6IHE** | * | **9,164** | **192** | **7** | **51** |
| EA7NW | * | 667 | 21 | 5 | 18 |
| SM5CCT/3 | * | 660 | 32 | 4 | 16 |

## ASSISTED

### NORTH AMERICA

#### UNITED STATES

| | | | | | |
|---|---|---|---|---|---|
| **K1OA** | A | **2,927,579** | **1615** | **129** | **514** |
| **N1DG** | * | **2,599,908** | **1293** | **144** | **579** |
| **K1NU** | * | **2,586,789** | **1461** | **136** | **507** |
| W1NG | * | 2,080,752 | 1177 | 139 | 508 |
| K1GU | * | 1,788,480 | 1175 | 117 | 423 |
| W1AO | * | 1,763,280 | 1052 | 128 | 492 |
| K2TE/1 | * | 1,657,338 | 1129 | 124 | 438 |
| W1AA | * | 1,459,620 | 984 | 117 | 423 |
| | | | | (Op: K1VV) | |
| W1TO | * | 1,449,700 | 1000 | 120 | 425 |
| W1QK | * | 1,388,057 | 1117 | 107 | 384 |
| N6RFM/1 | * | 1,303,183 | 841 | 128 | 453 |
| W1RZF | * | 1,047,695 | 886 | 107 | 366 |
| K1AE | * | 996,812 | 696 | 120 | 428 |
| K1RV | * | 816,822 | 731 | 95 | 319 |
| K1LD | * | 775,476 | 656 | 107 | 361 |
| W1EBI | * | 702,180 | 665 | 89 | 326 |
| AA1V | * | 649,040 | 475 | 116 | 416 |
| W1JR | * | 607,680 | 547 | 107 | 315 |
| W1HR | * | 461,812 | 402 | 98 | 330 |
| N1RJF | * | 408,360 | 501 | 78 | 254 |
| K1JB | * | 374,748 | 422 | 87 | 247 |
| K1TH | * | 371,588 | 455 | 74 | 248 |
| W1ZS | * | 266,976 | 387 | 76 | 212 |
| K1TR | * | 245,690 | 313 | 78 | 233 |
| K1JN | * | 214,200 | 280 | 80 | 200 |
| KG1D | * | 142,188 | 283 | 65 | 181 |
| W1EZ | * | 107,008 | 201 | 55 | 154 |
| K1OZ | * | 64,144 | 161 | 46 | 106 |
| K1TW | * | 53,392 | 133 | 48 | 94 |
| N1MD | * | 38,324 | 106 | 37 | 106 |
| WV1M | * | 27,577 | 98 | 37 | 72 |
| K1HI | * | 19,992 | 85 | 25 | 73 |
| N1NQD | * | 1,480 | 19 | 18 | 19 |
| **K2NG** | A | **3,922,595** | **1868** | **158** | **647** |
| **N2MM** | * | **3,753,664** | **2120** | **151** | **561** |
| **NO2R** | * | **3,199,317** | **1632** | **153** | **584** |
| **W2WB** | * | **3,076,652** | **1700** | **154** | **562** |
| W1GD/2 | * | 2,990,400 | 1584 | 140 | 532 |
| K2NJ | * | 2,972,420 | 1664 | 135 | 514 |
| N2BA | * | 2,755,840 | 1616 | 136 | 504 |
| K2ONP | * | 2,485,390 | 1441 | 139 | 496 |
| N1EU/2 | * | 2,302,596 | 1241 | 137 | 531 |
| K2PS | * | 2,184,668 | 1329 | 133 | 471 |
| NA2U | * | 2,001,445 | 1151 | 137 | 516 |
| KF2O | * | 1,665,840 | 958 | 143 | 517 |
| W2RE | * | 1,426,500 | 1169 | 113 | 387 |
| K2DM | * | 1,293,405 | 904 | 122 | 407 |
| N2TK | * | 1,182,809 | 652 | 145 | 552 |
| K2EP | * | 1,075,725 | 748 | 112 | 413 |
| WK2G | * | 1,029,170 | 817 | 110 | 375 |
| W2YK | * | 987,390 | 748 | 118 | 412 |
| W2KA | * | 862,679 | 694 | 116 | 363 |
| N2CQ | * | 773,800 | 681 | 94 | 330 |
| W2LE | * | 771,525 | 707 | 88 | 317 |
| N2NI | * | 739,389 | 709 | 95 | 316 |
| N1JP/2 | * | 725,322 | 646 | 94 | 348 |
| N2AB | * | 680,024 | 753 | 80 | 254 |
| KA2D | * | 608,317 | 589 | 92 | 309 |
| K2OWE | * | 601,867 | 580 | 113 | 384 |
| K2XF | * | 490,842 | 463 | 91 | 316 |
| W6XR/2 | * | 329,300 | 364 | 86 | 270 |
| NY6DX/2 | * | 328,848 | 404 | 93 | 279 |
| W2RD | * | 252,395 | 280 | 96 | 257 |
| KE2SD | * | 203,632 | 362 | 63 | 223 |
| N1RK/2 | * | 175,828 | 288 | 61 | 165 |
| WK2H | * | 174,150 | 311 | 48 | 167 |
| KD2HE | * | 147,356 | 307 | 48 | 149 |
| N2VW | * | 138,500 | 253 | 72 | 178 |
| N2FF | * | 74,613 | 191 | 54 | 133 |
| N2KPB | * | 64,152 | 187 | 63 | 180 |
| W2RDS | * | 32,128 | 99 | 39 | 89 |
| **W2UP/3** | A | **7,171,760** | **3291** | **162** | **623** |
| **K3WW** | * | **6,044,506** | **2945** | **163** | **603** |
| **K3PH** | * | **3,046,180** | **1615** | **146** | **537** |
| W3FV | * | 3,002,167 | 1712 | 137 | 506 |
| N3AM | * | 2,376,362 | 1376 | 137 | 492 |
| W3GG | * | 2,354,669 | 1531 | 128 | 471 |
| K3ND | * | 1,973,609 | 1121 | 134 | 515 |
| K3MD | * | 1,955,250 | 1404 | 120 | 430 |
| W3ZL | * | 1,817,554 | 1590 | 105 | 317 |
| K3PP | * | 1,619,815 | 938 | 140 | 515 |
| N3NA | * | 1,565,760 | 1022 | 134 | 426 |
| WT3W | * | 1,457,832 | 1059 | 116 | 440 |
| WT3P | * | 1,303,040 | 931 | 113 | 399 |
| K3NM | * | 1,294,947 | 830 | 136 | 521 |
| K3CP | * | 1,078,858 | 738 | 121 | 430 |
| NN3Q | * | 1,051,899 | 797 | 112 | 409 |
| K3NZ | * | 971,633 | 952 | 97 | 306 |
| W3GK | * | 960,076 | 781 | 119 | 362 |
| N3ZA | * | 933,014 | 624 | 126 | 445 |
| WE3C | * | 867,690 | 726 | 122 | 343 |
| W3OV | * | 862,638 | 851 | 87 | 312 |
| W3CF | * | 662,268 | 631 | 96 | 362 |
| KQ3F | * | 636,660 | 713 | 72 | 252 |
| AD8J/3 | * | 614,231 | 620 | 96 | 293 |
| N3MK | * | 562,010 | 500 | 90 | 340 |
| W3IQ | * | 557,648 | 596 | 83 | 281 |
| K3SV | * | 480,320 | 492 | 97 | 283 |
| N4GG/3 | * | 386,818 | 407 | 94 | 273 |
| W3ZZ | * | 342,304 | 457 | 85 | 219 |
| W3HVQ | * | 302,289 | 365 | 97 | 240 |
| K3JG | * | 216,440 | 292 | 63 | 217 |
| W3IZ | * | 174,825 | 288 | 69 | 190 |
| NY3C | * | 154,784 | 258 | 55 | 169 |
| K3ATO | * | 130,530 | 260 | 69 | 160 |
| W3FG | * | 102,600 | 206 | 55 | 135 |
| W3FVT | * | 69,597 | 182 | 54 | 117 |
| NZ3O | * | 62,361 | 137 | 52 | 117 |
| KD3TB | * | 53,040 | 162 | 52 | 118 |
| **WR3L** | 28 | **121,793** | **328** | **28** | **109** |
| **K3KO/4** | A | **2,052,012** | **1194** | **134** | **497** |
| **K1PT/4** | * | **1,940,856** | **1269** | **128** | **440** |
| **N4VV** | * | **1,615,440** | **1137** | **121** | **409** |
| K4MM | * | 1,173,930 | 839 | 125 | 420 |
| W9WI/4 | * | 1,023,111 | 816 | 108 | 351 |
| K4LQ | * | 1,018,818 | 714 | 121 | 392 |
| K4UTE | * | 1,006,770 | 696 | 124 | 431 |
| K4PB | * | 782,250 | 652 | 113 | 334 |
| N8PR/4 | * | 633,204 | 489 | 126 | 366 |
| W4ZW | * | 606,879 | 615 | 107 | 292 |
| K3WA/4 | * | 489,834 | 484 | 91 | 332 |
| WA4IRE | * | 486,814 | 498 | 99 | 302 |
| WR4K | * | 173,505 | 272 | 80 | 189 |
| K4YT | * | 164,288 | 256 | 78 | 194 |
| K2SD/4 | * | 132,300 | 256 | 64 | 161 |
| AD4IE | * | 76,020 | 188 | 49 | 132 |
| K4SAC | * | 33,210 | 141 | 56 | 106 |
| K3MZ/4 | * | 27,233 | 99 | 44 | 69 |
| N4XMX | * | 12,533 | 59 | 31 | 52 |
| N4XM | * | 4,410 | 45 | 15 | 34 |
| **W4/G4BUE** | 14 | **95,667** | **308** | **34** | **109** |
| **N4CC** | 7 | **264,875** | **601** | **35** | **128** |
| NE4S | * | 78,750 | 290 | 25 | 100 |
| **N8SM/5** | A | **2,922,150** | **1504** | **165** | **561** |
| **K5NA** | * | **2,838,470** | **1386** | **173** | **617** |
| **K5TR** | * | **2,333,080** | **1270** | **164** | **556** |
| W5VX | * | 1,869,378 | 1170 | 156 | 502 |
| W5ZO | * | 953,344 | 801 | 132 | 380 |
| W5FL | * | 927,420 | 736 | 122 | 370 |
| N5JR | * | 750,168 | 653 | 109 | 305 |
| K1NT/5 | * | 701,385 | 720 | 110 | 327 |
| N3BB/5 | * | 296,037 | 419 | 87 | 172 |
| W5GN | * | 168,544 | 301 | 69 | 160 |
| N5MT | * | 105,664 | 228 | 57 | 151 |
| NA4M/5 | * | 100,152 | 169 | 55 | 159 |
| NEØP/5 | * | 38,205 | 116 | 61 | 74 |
| W5TM | * | 29,436 | 109 | 45 | 87 |
| **NX5N** | 21 | **107,850** | **340** | **32** | **118** |
| **W5AJ** | 1.8 | **5,141** | **35** | **24** | **29** |
| NX5M | * | 1,140 | 27 | 7 | 13 |
| **K6XT** | A | **1,242,540** | **805** | **148** | **437** |
| **K6XX** | * | **1,140,192** | **943** | **124** | **320** |
| **W6TK** | * | **529,525** | **599** | **115** | **244** |
| KD6WW | * | 433,044 | 590 | 87 | 189 |
| WO6M | * | 405,076 | 510 | 105 | 217 |
| KI6T | * | 383,050 | 445 | 106 | 220 |
| W6IXP | * | 347,100 | 515 | 97 | 203 |
| N6WS | * | 268,800 | 350 | 94 | 206 |
| WA6TLA | * | 179,265 | 266 | 82 | 173 |
| ND2T/6 | * | 107,087 | 271 | 64 | 109 |
| NM6E | * | 35,072 | 161 | 60 | 77 |
| K6III | * | 19,947 | 90 | 47 | 62 |
| W4EF/6 | * | 2,596 | 23 | 22 | 22 |
| **W6RKC** | 7 | **11,055** | **76** | **22** | **33** |
| **N7TT** | A | **1,248,528** | **1045** | **137** | **307** |
| K7BV | * | 814,955 | 787 | 94 | 325 |
| W7OM | * | 747,682 | 850 | 117 | 269 |
| W7BX | * | 286,650 | 376 | 95 | 199 |
| W7MCU | * | 138,601 | 232 | 102 | 161 |
| K7BG | * | 110,894 | 259 | 68 | 110 |
| N7XY | * | 32,264 | 121 | 48 | 61 |
| **W7ZR** | 28 | **173,340** | **532** | **30** | **105** |
| **W7UT** | 21 | **436,100** | **916** | **37** | **138** |
| N7OR | * | 165,564 | 497 | 32 | 94 |
| **N8BJQ** | A | **2,618,616** | **1447** | **144** | **510** |
| **K8AL** | * | **2,142,288** | **1198** | **158** | **526** |
| N8RA | * | 1,226,624 | 861 | 110 | 408 |
| ND5S/8 | * | 978,663 | 654 | 135 | 474 |
| N8KM | * | 488,756 | 425 | 111 | 325 |
| AA8LL | * | 458,451 | 473 | 110 | 289 |
| W8ZA | * | 256,366 | 348 | 64 | 207 |
| KI8IZ | * | 212,280 | 322 | 77 | 213 |
| N3RA/8 | * | 96,798 | 185 | 60 | 159 |
| K8YC | * | 78,804 | 165 | 56 | 143 |
| K8LN | * | 49,518 | 147 | 37 | 94 |
| **K8MV** | 7 | **79,728** | **267** | **29** | **103** |
| **W8TOP** | 1.8 | **236** | **112** | **20** | **39** |
| | | | (Op: W8UVZ) | | |
| **K9UQN** | A | **860,924** | **769** | **96** | **308** |
| **WE9V** | * | **708,288** | **534** | **116** | **380** |
| W9OL | * | 637,200 | 694 | 90 | 310 |
| K9NR | * | 511,560 | 570 | 112 | 294 |
| N2BJ/9 | * | 424,951 | 392 | 92 | 317 |
| K9IMM | * | 267,630 | 336 | 79 | 251 |
| KF9YR | * | 154,365 | 249 | 67 | 184 |
| NF9V | * | 151,840 | 262 | 57 | 151 |
| AI9T | * | 131,376 | 207 | 82 | 190 |
| NN9K | * | 87,526 | 197 | 53 | 161 |
| N9BOR | * | 56,885 | 153 | 54 | 101 |
| NA9D | * | 33,280 | 93 | 47 | 83 |
| KM9M | * | 22,990 | 84 | 41 | 69 |
| KB9KEG | * | 12,222 | 83 | 36 | 61 |
| **N9SE** | 14 | **105,570** | **297** | **35** | **118** |
| **N9AU** | 7 | **138,320** | **338** | **33** | **119** |
| **KU1CW/Ø** | A | **1,623,680** | **1125** | **148** | **442** |
| **NØAT** | * | **1,143,360** | **773** | **139** | **437** |
| AE9B/Ø | * | 858,348 | 783 | 120 | 332 |
| N5IN/Ø | * | 661,478 | 646 | 123 | 331 |
| NØHJZ | * | 368,988 | 376 | 104 | 284 |
| AKØM | * | 363,912 | 412 | 106 | 248 |
| KØIR | * | 357,780 | 420 | 93 | 242 |
| K4IU/Ø | * | 212,598 | 318 | 92 | 187 |
| KØXH | * | 184,800 | 268 | 80 | 184 |
| WØTT | * | 162,840 | 281 | 69 | 167 |
| KTØR | * | 143,040 | 242 | 69 | 171 |
| KØBX | * | 135,273 | 250 | 60 | 141 |
| KØPC | * | 97,800 | 192 | 55 | 145 |
| KØUK | * | 79,170 | 225 | 67 | 115 |
| WGØM | * | 40,581 | 132 | 57 | 110 |
| WA2MNO/Ø | * | 18,909 | 96 | 38 | 61 |
| WØAMT | * | 9,720 | 68 | 35 | 46 |
| WØMN | * | 6,106 | 71 | 32 | 39 |
| WØVC | * | 2,205 | 26 | 19 | 26 |
| AGØT | * | 2,014 | 23 | 16 | 22 |
| ACØX | * | 280 | 8 | 7 | 7 |
| **NØRA** | 21 | **190,224** | **529** | **34** | **110** |

#### BARBADOS

| | | | | | |
|---|---|---|---|---|---|
| **8P6SH** | A | **157,550** | **332** | **66** | **164** |

#### CANADA

| | | | | | |
|---|---|---|---|---|---|
| **VE1OP** | A | **1,806,558** | **1546** | **106** | **388** |
| VO1TA | * | 745,032 | 998 | 69 | 227 |
| VE3NEA | * | 247,234 | 401 | 55 | 202 |
| VE6LB | * | 53,760 | 204 | 52 | 76 |
| VE3IAY | * | 4,750 | 41 | 17 | 33 |
| **VE7AV** | 14 | **245,920** | **738** | **35** | **110** |
| **VE3ZI** | 1.8 | **13,728** | **194** | **13** | **26** |

#### MEXICO

| | | | | | |
|---|---|---|---|---|---|
| **XE1KK** | A | **191,262** | **322** | **82** | **172** |

## AFRICA

#### AFRICAN ITALY

| | | | | | |
|---|---|---|---|---|---|
| **IG9A** | A | **10,240,830** | **5154** | **151** | **554** |
| | | | | (Op: IKØYVV) | |

#### MADEIRA ISLANDS

| | | | | | |
|---|---|---|---|---|---|
| **CT9M** | A | **11,225,452** | **5181** | **159** | **605** |
| | | | | (Op: DL2CC) | |

#### SOUTH AFRICA

| | | | | | |
|---|---|---|---|---|---|
| **ZS4TX** | 28 | **1,543,404** | **3322** | **36** | **128** |

## ASIA

#### ASIATIC RUSSIA

| | | | | | |
|---|---|---|---|---|---|
| **RX9SX** | A | **4,276,258** | **3014** | **124** | **438** |
| UA9AM | * | 3,951,670 | 2041 | 159 | 596 |
| **RA9JR** | 21 | **487,335** | **1467** | **35** | **124** |
| **RA9AC** | 14 | **283,330** | **745** | **33** | **112** |
| **UA9AT** | 1.8 | **114,080** | **578** | **14** | **66** |
| **UAØAGI** | A | **786,010** | **980** | **113** | **302** |
| **RSØF** | 28 | **277,704** | **1022** | **36** | **90** |
| | | | | (Op: UAØFZ) | |
| **UAØSC** | 14 | **134,082** | **490** | **29** | **88** |
| RAØAM | * | 4,094 | 65 | 16 | 30 |
| **RUØLL** | 7 | **308,352** | **1142** | **34** | **98** |
| RAØCG | * | 175,861 | 984 | 31 | 66 |

#### ASIATIC TURKEY

| | | | | | |
|---|---|---|---|---|---|
| **TA2/Z31GX** | 7 | **303,810** | **1002** | **22** | **92** |

#### JAPAN

| | | | | | |
|---|---|---|---|---|---|
| **JH7PKU** | A | **3,827,040** | **2704** | **162** | **382** |
| **JA3YPL** | * | **702,860** | **850** | **97** | **214** |
| | | | | (Op: JJ3TBB) | |
| **JH7XMO** | * | **485,275** | **762** | **116** | **179** |
| **JH5OXF** | * | **411,380** | **588** | **92** | **176** |
| JN3SAC | * | 326,200 | 522 | 72 | 161 |
| JF2SKV | * | 191,290 | 324 | 95 | 140 |
| JG3VEI/1 | * | 174,900 | 340 | 77 | 143 |
| JK1FNL | * | 154,775 | 322 | 81 | 124 |
| 7L4IOU | * | 73,392 | 184 | 74 | 102 |
| JA7JHT | * | 67,050 | 179 | 71 | 78 |
| 7N2DAB | * | 47,085 | 151 | 59 | 70 |
| JF2FIU | * | 4,715 | 39 | 19 | 22 |
| **JH9KVF** | 28 | **155,232** | **551** | **33** | **79** |
| **JA9VOK** | 21 | **229,416** | **704** | **32** | **89** |
| JA2XCR | * | 108,625 | 361 | 32 | 93 |
| **JI3BFC** | 14 | **180,566** | **505** | **35** | **102** |
| | | | | (Op: JF3GKE) | |
| **JS3CTQ** | 7 | **100,104** | **384** | **29** | **68** |
| JAØFVU | * | 30,415 | 158 | 25 | 52 |
| JM2RUV | * | 23,856 | 118 | 30 | 54 |

#### JORDAN

| | | | | | |
|---|---|---|---|---|---|
| **JY9QJ** | A | **5,208,905** | **3119** | **138** | **493** |

#### KOREA

| | | | | | |
|---|---|---|---|---|---|
| **HL1VAU** | A | **117,174** | **315** | **63** | **114** |

#### LEBANON

| | | | | | |
|---|---|---|---|---|---|
| **OD5/OK1MU** | 28 | **988,960** | **2432** | **34** | **126** |

## EUROPE

#### AUSTRIA

| | | | | | |
|---|---|---|---|---|---|
| **OE8CIQ** | A | **1,174,675** | **1570** | **111** | **364** |
| OE1EMS | * | 198,550 | 500 | 68 | 207 |
| **OE2S** | 28 | **488,788** | **1328** | **36** | **142** |
| | | | | (Op: OE2VEL) | |
| **OE3ZK** | 14 | **176,932** | **818** | **32** | **110** |
| **OE5OHO** | 7 | **401,605** | **1528** | **34** | **121** |

#### BELARUS

| | | | | | |
|---|---|---|---|---|---|
| **EU1AZ** | 7 | **116,964** | **648** | **24** | **90** |

#### BELGIUM

| | | | | | |
|---|---|---|---|---|---|
| **OT2A** | 21 | **572,352** | **1655** | **36** | **140** |
| | | | | (Op: ON5UM) | |
| **ON4APU** | 14 | **161,797** | **712** | **29** | **108** |

#### BOSNIA-HERZEGOVINA

| | | | | | |
|---|---|---|---|---|---|
| **T94NO** | 28 | **269,920** | **948** | **34** | **106** |
| **T96Q** | 21 | **567,168** | **1810** | **35** | **133** |
| | | | | (Op: T97M) | |

#### CROATIA

| | | | | | |
|---|---|---|---|---|---|
| **9A5Y** | 28 | **656,238** | **1649** | **35** | **148** |
| | | | | (Op: 9A3NM) | |

#### CZECH REPUBLIC

| | | | | | |
|---|---|---|---|---|---|
| **OK2FD** | A | **3,081,045** | **1992** | **158** | **631** |
| **OK1FDY** | * | **1,769,482** | **2159** | **110** | **428** |
| OK2EQ | * | 734,400 | 1107 | 84 | 348 |
| OK1FPG | * | 392,147 | 479 | 99 | 272 |
| OK1DG | * | 384,146 | 693 | 75 | 247 |
| OK2ZJ | * | 379,830 | 700 | 75 | 255 |
| OK2ZC | * | 376,798 | 848 | 69 | 224 |
| **OK1DVM** | 21 | **196,053** | **702** | **33** | **110** |

#### ENGLAND

| | | | | | |
|---|---|---|---|---|---|
| **M2D** | 1.8 | **70,875** | **797** | **12** | **69** |
| | | | | (Op: G4BYG) | |

#### EUROPEAN RUSSIA

| | | | | | |
|---|---|---|---|---|---|
| **RK3WWA** | A | **815,184** | **1356** | **100** | **332** |
| | | | | (Op: UA3WU) | |
| RN3AY | * | 765,375 | 1109 | 108 | 363 |
| RU3AT | * | 30,294 | 103 | 59 | 94 |
| RK3DH | * | 23,064 | 97 | 44 | 80 |
| **RA6LBS** | 21 | **195,888** | **853** | **31** | **128** |
| **RZ3QU** | 1.8 | **57,333** | **580** | **15** | **72** |

#### FINLAND

| | | | | | |
|---|---|---|---|---|---|
| **OH6NIO** | A | **2,748,466** | **2009** | **133** | **525** |
| OH2LU | * | 695,510 | 882 | 99 | 344 |
| OH4RH | * | 215,160 | 506 | 69 | 195 |
| OH1XT | * | 98,040 | 279 | 59 | 113 |
| OH1MM | * | 68,012 | 197 | 54 | 142 |
| **OH6NJ** | 28 | **223,468** | **772** | **34** | **127** |
| **OH2BO** | 1.8 | **27,141** | **304** | **14** | **69** |
| OH3BU | * | 15,000 | 225 | 8 | 52 |

#### FRANCE

| | | | | | |
|---|---|---|---|---|---|
| **F6FFM** | A | **623,290** | **775** | **93**

| | | | | | |
|---|---|---|---|---|---|
| PA1CC | * | 259,490 | 882 | 32 | 122 |
| **PA3EWP** | **14** | **340,974** | **1235** | **36** | **135** |
| **NORWAY** | | | | | |
| **LN3R** | **A** | **547,272** | **913** | **83** | **313** |
| | | | **(Op: LA5LJA)** | | |
| **POLAND** | | | | | |
| **SN8F** | **A** | **2,419,060** | **2929** | **124** | **394** |
| | | | **(Op: SP8FHK)** | | |
| SP4Z | * | 1,514,002 | 1297 | 151 | 535 |
| | | | (Op: SP4EEZ) | | |
| **SN8V** | **14** | **331,380** | **1454** | **35** | **105** |
| **SCOTLAND** | | | | | |
| **MMØBQI** | **A** | **293,951** | **511** | **79** | **264** |
| **SLOVAK REPUBLIC** | | | | | |
| **OM8A** | **A** | **2,428,200** | **2080** | **139** | **500** |
| | | | **(Op: OM3RM)** | | |
| OM5M | * | 2,181,830 | 2294 | 121 | 376 |
| | | | (Op: OM4DW) | | |
| **OMØR** | **28** | **552,948** | **1460** | **36** | **141** |
| | | | **(Op: OM3GI)** | | |
| **OM3NA** | **14** | **445,824** | **1582** | **37** | **125** |
| **OM7PY** | **7** | **59,148** | **404** | **21** | **85** |
| **SLOVENIA** | | | | | |
| **S58A** | **A** | **6,227,543** | **3846** | **166** | **625** |
| S52ZW | * | 4,001,408 | 3071 | 144 | 544 |
| S52U | * | 275,080 | 491 | 76 | 223 |
| S53AU | * | 196,000 | 273 | 80 | 200 |
| **S51RJ** | **28** | **603,012** | **1649** | **36** | **150** |
| **S51U** | **14** | **48,257** | **259** | **26** | **81** |
| **S5ØG** | **7** | **226,200** | **1114** | **30** | **86** |
| | | | | **(Op: S56M)** | |
| **S57M** | **1.8** | **88,536** | **938** | **16** | **77** |
| **SPAIN** | | | | | |
| **EA5FV** | **A** | **3,940,686** | **3122** | **136** | **521** |
| EA3GM | * | 557,200 | 1042 | 87 | 311 |
| EA1FBJ | * | 108,600 | 387 | 50 | 150 |
| **SWEDEN** | | | | | |
| **SM2LIY** | **A** | **765,160** | **1076** | **88** | **382** |
| **SM6BSK** | **"** | **688,296** | **1052** | **93** | **315** |
| SM7E | * | 425,412 | 808 | 76 | 275 |
| | | | (Op: SM7BHM) | | |
| SM7CQY | * | 269,252 | 583 | 87 | 245 |
| SM5HJZ | * | 27,248 | 159 | 32 | 99 |
| **SM4F** | **21** | **332,830** | **1087** | **36** | **130** |
| | | | **(Op: SM4DHF)** | | |
| **SM5D** | **14** | **270,319** | **997** | **36** | **125** |
| | | | **(Op: SM5DJZ)** | | |
| 8S5X | * | 147,701 | 655 | 29 | 98 |
| | | | (Op: SM5HJZ) | | |
| **7S3A** | **7** | **166,294** | **813** | **30** | **104** |
| | | | **(Op: SM3CER)** | | |
| **SWITZERLAND** | | | | | |
| **HB9JNU** | **A** | **247,800** | **493** | **93** | **261** |
| **UKRAINE** | | | | | |
| **UW5Q** | **A** | **3,281,680** | **2928** | **139** | **507** |
| | | | **(Op: UR3QCW)** | | |
| UY8IF | * | 1,155,584 | 1629 | 121 | 391 |
| **UT7UJ** | **21** | **174,470** | **702** | **32** | **114** |
| UXØIB | * | 119,341 | 648 | 30 | 101 |
| **UR6QA** | **14** | **548,820** | **1700** | **38** | **142** |
| **US2IR** | **7** | **503,388** | **1758** | **37** | **140** |
| **YUGOSLAVIA** | | | | | |
| **YU1UA** | **1.8** | **2,240** | **50** | **6** | **34** |

## OCEANIA

| | | | | | |
|---|---|---|---|---|---|
| **NEW ZEALAND** | | | | | |
| **ZL3GA** | **28** | **7,068** | **74** | **19** | **19** |
| **NORTHERN MARIANAS** | | | | | |
| **KHØ/JF2VAX** | **A** | **1,866,606** | **2299** | **97** | **197** |

## SOUTH AMERICA

| | | | | | |
|---|---|---|---|---|---|
| **ARGENTINA** | | | | | |
| **LT5H** | **28** | **45,446** | **304** | **19** | **43** |
| | | | | **(Op: LU9HPN)** | |
| **BRAZIL** | | | | | |
| **PY1NX** | **28** | **52,207** | **238** | **29** | **54** |
| **PY2WC** | **14** | **595,080** | **1462** | **34** | **118** |
| **VENEZUELA** | | | | | |
| **YV4GLD** | **A** | **1,125,250** | **2290** | **98** | **252** |

## MULTI-OPERATOR SINGLE TRANSMITTER

### NORTH AMERICA

| | | | | |
|---|---|---|---|---|
| **UNITED STATES** | | | | |
| **K1KI** | **8,128,326** | **3546** | **177** | **672** |
| **K1IR** | **6,638,640** | **3341** | **160** | **636** |
| N1AU | 925,680 | 800 | 105 | 351 |
| W1FM | 445,822 | 528 | 89 | 249 |
| KX1X | 570 | 77 | 43 | 52 |
| **W2FU** | **6,751,892** | **3261** | **175** | **648** |
| WE2F | 3,226,314 | 1944 | 143 | 479 |
| K2G | 1,150,086 | 1738 | 100 | 178 |
| AE2F | 715,878 | 568 | 105 | 381 |
| NA2NA | 706,000 | 715 | 109 | 391 |
| **NE3F** | **2,081,875** | **1463** | **135** | **490** |
| W3LJ | 833,112 | 725 | 107 | 349 |
| K3BSA | 146,250 | 346 | 62 | 172 |
| **W2YE/4** | **1,486,800** | **1072** | **122** | **409** |
| K9ES/4 | 1,417,278 | 1227 | 132 | 465 |
| **K5NZ** | **5,086,452** | **2469** | **171** | **627** |
| KK5K | 56,169 | 383 | 68 | 169 |
| KN6Y | 5,928 | 211 | 63 | 89 |
| **W7VJ** | **1,446,071** | **1374** | **132** | **275** |
| N7TL | 104,608 | 242 | 80 | 144 |
| W7SIR | 7,128 | 103 | 41 | 67 |
| **K8AZ** | **6,186,515** | **2866** | **177** | **658** |
| NØFW/8 | 1,852,220 | 1092 | 157 | 583 |
| WC8VOA | 27,324 | 242 | 62 | 136 |
| **WN9O** | **1,859,535** | **1138** | **138** | **507** |
| **KØKX** | **2,477,038** | **1502** | **150** | **484** |
| KBØVVT | 665,792 | 640 | 116 | 288 |
| **BAHAMAS** | | | | |
| **C6AJX** | **3,912,656** | **3962** | **115** | **369** |
| **CANADA** | | | | |
| **VE7SV** | **4,427,808** | **3795** | **152** | **376** |
| **VE7UF** | **2,903,277** | **2942** | **135** | **318** |
| VE7GL | 2,761,030 | 2987 | 132 | 298 |
| VE6SV | 2,291,740 | 2398 | 128 | 356 |
| VO2WL | 1,935,988 | 2156 | 101 | 311 |
| VE3RM | 1,737,216 | 1486 | 117 | 395 |
| VE6AO | 617,808 | 1310 | 85 | 159 |
| **CAYMAN ISLANDS** | | | | |
| **ZF1A** | **10,893,000** | **6513** | **157** | **593** |
| **CUBA** | | | | |
| **T48K** | **3,513,015** | **3607** | **108** | **345** |
| **HONDURAS** | | | | |
| **HQ3J** | **2,646,069** | **3570** | **109** | **284** |
| **PUERTO RICO** | | | | |
| **KP4US** | **2,042,625** | **2847** | **98** | **277** |
| **SABLE I.** | | | | |
| **CYØMM** | **3,815,120** | **4241** | **106** | **306** |

## AFRICA

| | | | | |
|---|---|---|---|---|
| **CANARY ISLANDS** | | | | |
| **EA8/DL6QW** | **3,054,180** | **2287** | **97** | **370** |
| **CAPE VERDE** | | | | |
| **D44TD** | **13,092,536** | **6494** | **168** | **656** |

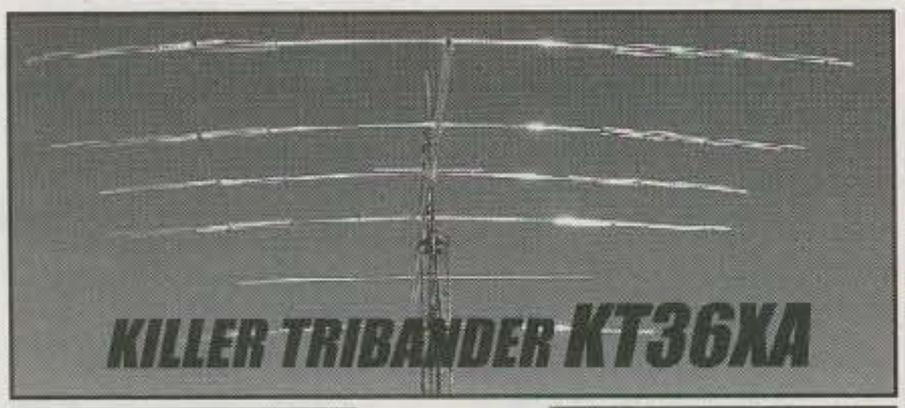
## ASIA

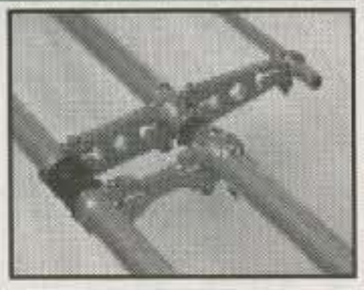
| | | | | |
|---|---|---|---|---|
| **ASIATIC RUSSIA** | | | | |
| **RT9W** | **8,988,696** | **4460** | **162** | **624** |
| RW9C | 5,715,684 | 3327 | 148 | 554 |
| RK9CZO | 5,242,752 | 2988 | 144 | 522 |
| RK9TWA | 2,959,360 | 2369 | 128 | 416 |
| RK9JWV | 1,281,834 | 1704 | 88 | 266 |
| RZ9UWZ | 225,040 | 574 | 46 | 148 |
| **AZERBAIJAN** | | | | |
| **4K7Z** | **1,266,612** | **1703** | **81** | **273** |
| **CHINA** | | | | |
| **B4R** | **1,951,082** | **2500** | **131** | **332** |
| **CYPRUS** | | | | |
| **P3A** | **19,470,528** | **8432** | **176** | **702** |
| **IRAQ** | | | | |
| **YI9OM** | **6,782,259** | **4838** | **130** | **421** |
| **JAPAN** | | | | |
| **JA7YAA** | **5,250,323** | **2990** | **173** | **488** |
| **JA8RWU** | **4,083,142** | **2593** | **168** | **455** |
| JK6SEW | 3,550,200 | 2556 | 158 | 452 |
| JJ3YBB | 3,153,962 | 2957 | 143 | 354 |
| JA1YPA | 1,939,406 | 1899 | 127 | 310 |
| JA3YUA | 1,330,290 | 1351 | 125 | 254 |
| JA3YDH | 160 | 6 | 5 | 5 |
| **KAZAKHSTAN** | | | | |
| **UP5G** | **4,357,668** | **3101** | **138** | **450** |
| **KOREA** | | | | |
| **HLØC** | **856,254** | **1857** | **87** | **172** |
| **MONGOLIA** | | | | |
| **JV5C** | **567,973** | **1728** | **86** | **201** |

## EUROPE

| | | | | |
|---|---|---|---|---|
| **AUSTRIA** | | | | |
| **OE3I** | **1,930,632** | **2194** | **121** | **447** |
| **BALEARIC ISLANDS** | | | | |
| **EA6IB** | **10,583,464** | **6206** | **177** | **739** |
| **BELGIUM** | | | | |
| **ON4IA** | **4,587,588** | **3495** | **143** | **563** |
| OT2P | 1,037,610 | 1513 | 110 | 376 |
| ON6NR | 317,800 | 1225 | 48 | 152 |
| **BULGARIA** | | | | |
| **LZ9W** | **6,479,905** | **4764** | **163** | **678** |
| LZ1ABC | 2,219,286 | 2356 | 122 | 444 |
| LZ9R | 2,106,324 | 2526 | 121 | 470 |
| **CROATIA** | | | | |
| **9A7A** | **8,448,192** | **5055** | **171** | **693** |
| **CZECH REPUBLIC** | | | | |
| **OK5W** | **8,040,428** | **4507** | **180** | **722** |
| **OL3A** | **5,511,961** | **3724** | **167** | **666** |
| OL7R | 3,735,924 | 3103 | 155 | 564 |
| OL5Q | 2,788,539 | 2893 | 126 | 437 |
| OL2A | 1,580,031 | 2132 | 108 | 341 |
| OL2U | 932,515 | 1512 | 95 | 348 |
| OK5SWL | 3,621 | 31 | 23 | 28 |
| **DENMARK** | | | | |
| **OZ5BAL** | **139,065** | **372** | **60** | **159** |
| **ENGLAND** | | | | |
| **M2A** | **5,951,232** | **4906** | **151** | **605** |
| G6PZ | 2,537,441 | 3045 | 118 | 445 |
| GX6YB | 2,352,159 | 3131 | 96 | 313 |
| G5X | 1,315,062 | 1820 | 98 | 328 |
| **ESTONIA** | | | | |
| **ES6Q** | **7,060,534** | **4336** | **179** | **707** |
| ES4MF | 103,790 | 477 | 50 | 164 |
| **EUROPEAN RUSSIA** | | | | |
| **R5CC** | **6,496,431** | **4435** | **172** | **695** |
| **RN6BN** | **6,062,688** | **3946** | **180** | **684** |
| RL3A | 5,598,593 | 4052 | 171 | 662 |
| RO4M | 4,880,320 | 3819 | 162 | 646 |
| RF3A | 3,438,760 | 3315 | 143 | 537 |
| RU6LWZ | 3,394,423 | 2668 | 166 | 631 |
| RZ1QZZ | 2,705,038 | 2727 | 145 | 513 |
| RI4C | 2,562,210 | 2907 | 133 | 497 |
| RD3R | 2,012,720 | 2366 | 123 | 433 |
| RK4WWA | 1,994,240 | 2363 | 127 | 481 |
| RZ6HWA | 1,905,808 | 1914 | 136 | 486 |
| RU6LWT | 1,543,788 | 2063 | 128 | 421 |
| RK6AYN | 773,244 | 1280 | 93 | 330 |
| RK1NWA | 321,963 | 659 | 73 | 248 |
| RK3RWA | 183,040 | 571 | 80 | 240 |
| RK3DZD | 12,636 | 174 | 22 | 59 |
| **FINLAND** | | | | |
| **OH7M** | **5,538,676** | **3504** | **168** | **674** |
| OH2BAH | 1,400,240 | 1809 | 107 | 353 |
| **FRANCE** | | | | |
| **TM5C** | **9,332,728** | **5464** | **162** | **680** |
| **TM2Y** | **7,540,520** | **4521** | **166** | **687** |
| F8UFT | 1,032,720 | 1990 | 93 | 297 |
| F6KJX | 621,192 | 1505 | 68 | 244 |
| F8KGH | 601,060 | 1123 | 89 | 321 |
| TM5SIA | 594,625 | 1128 | 74 | 281 |
| F5KLE | 224,784 | 550 | 67 | 185 |
| **GERMANY** | | | | |
| **DL6RAI** | **7,239,864** | **3977** | **170** | **718** |
| DLØAO | 3,217,710 | 2288 | 154 | 604 |
| DJ7TO | 2,901,060 | 2620 | 144 | 566 |
| DL7ANR | 2,399,965 | 2117 | 137 | 540 |
| DAØED | 1,920,402 | 1885 | 124 | 425 |
| DKØMN | 1,725,460 | 2217 | 104 | 402 |
| DKØFFO | 650,494 | 1121 | 85 | 309 |
| DLØMB | 512,256 | 690 | 100 | 284 |
| **HUNGARY** | | | | |
| **HG1S** | **7,187,616** | **4495** | **167** | **697** |
| HG8U | 1,475,994 | 2125 | 104 | 343 |
| HG5A | 1,327,477 | 2244 | 123 | 446 |
| HG1R | 1,267,263 | 2431 | 97 | 320 |
| HA6KZS | 137,182 | 580 | 53 | 173 |
| **ITALY** | | | | |
| **IQ4A** | **8,596,800** | **4628** | **179** | **721** |
| **IU2X** | **7,029,500** | **4364** | **165** | **685** |
| II1H | 3,387,192 | 2956 | 133 | 509 |
| IU2M | 2,727,902 | 2448 | 138 | 545 |
| IKØHBN | 1,485,328 | 1362 | 126 | 466 |
| **LATVIA** | | | | |
| **YL1A** | **679,494** | **1223** | **86** | **335** |
| **LUXEMBOURG** | | | | |
| **LX7I** | **3,037,430** | **3578** | **122** | **461** |
| **MOLDOVA** | | | | |
| **ER3R** | **1,460,844** | **2404** | **100** | **362** |
| **NETHERLANDS** | | | | |
| **PI4DEC** | **2,840,526** | **3154** | **124** | **473** |
| **PI4ZLD** | **2,175,082** | **2315** | **134** | **512** |
| PB6X | 1,441,352 | 2014 | 103 | 381 |
| PI4TUE | 34,640 | 339 | 16 | 64 |
| **NORWAY** | | | | |
| **LA1K** | **599,060** | **1163** | **83** | **302** |

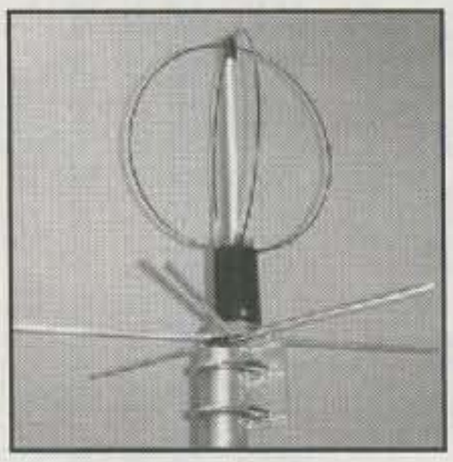

M2 PROVIDES COMMERCIAL QUALITY AT AMATEUR PRICES ...WITH CUSTOMER SERVICE SECOND TO NONE !





MOBILE OMNI
2M HO LOOP

SATELLITE
EB-144 & EB432

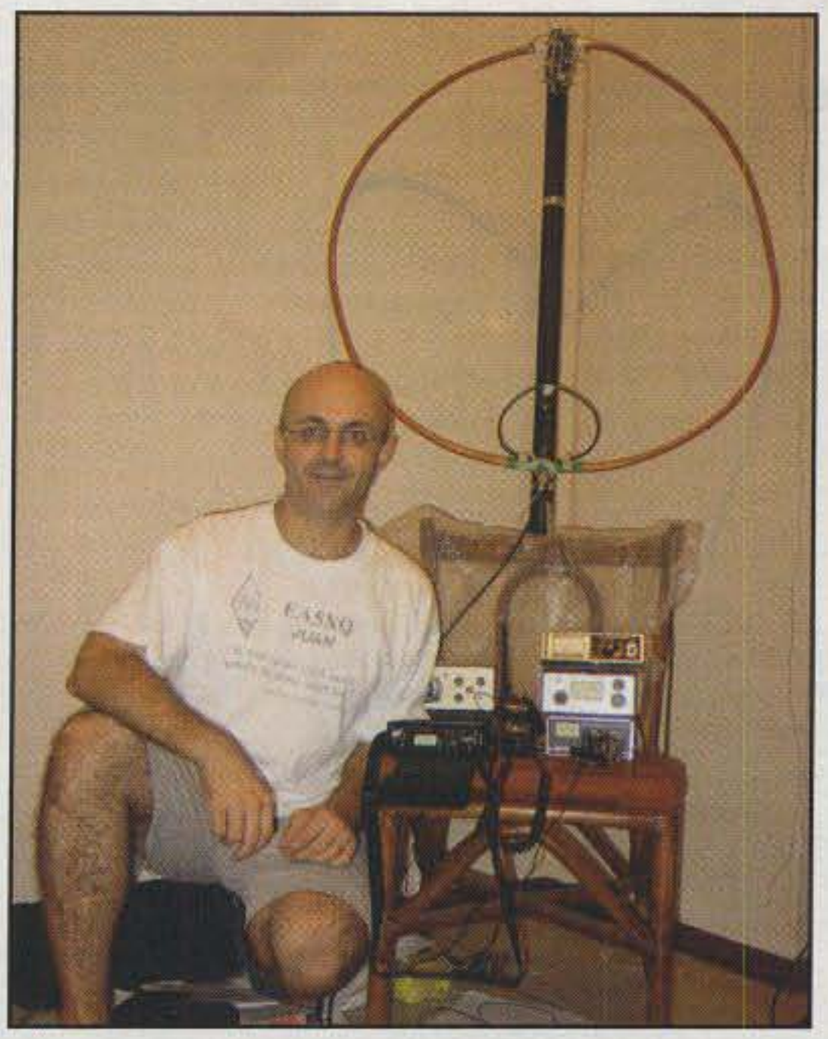


BRUTE STRENGTH
OR2800P ROTATOR

M2 Antenna Systems, Inc. 4402 N. Selland. Fresno, CA 93722 559-432-8873
Fax 559-432-3059 E-Mail: wyatt@m2inc.com Website : www.m2inc.com

MasterCard VISA DISCOVER

| | | | | |
|---|---|---|---|---|
| **POLAND** | | | | |
| **SQ6Z** | **4,944,951** | **3844** | **157** | **596** |
| SPØPZK | 648,372 | 898 | 95 | 331 |
| SP9KRT | 596,068 | 1185 | 96 | 341 |
| SP8YCB | 123,760 | 417 | 60 | 178 |
| SP6KFA | 110,160 | 483 | 37 | 125 |
| SP2KDS | 32,025 | 150 | 35 | 70 |
| SP3KPN | 712 | 25 | 11 | 23 |
| **SLOVAK REPUBLIC** | | | | |
| **OM7M** | **7,775,040** | **4625** | **181** | **729** |
| **OMØM** | **6,543,370** | **4155** | **169** | **652** |
| OM3KHO | 1,182,960 | 1638 | 94 | 330 |
| **SLOVENIA** | | | | |
| **S59ABC** | **2,046,380** | **2510** | **122** | **348** |
| **SPAIN** | | | | |
| **EA5HQ** | **2,777,720** | **3202** | **107** | **428** |
| EA2URD | 1,605,660 | 2263 | 97 | 323 |
| ED2JJ | 376,869 | 1204 | 59 | 210 |
| EA1FBB | 30,800 | 186 | 47 | 107 |
| **SWEDEN** | | | | |
| **SK3W** | **8,226,516** | **4433** | **178** | **698** |
| SL2ZA | 549,080 | 963 | 83 | 288 |
| **SWITZERLAND** | | | | |
| **HB9CRV** | **1,871,932** | **2762** | **105** | **374** |
| HB9OK | 581,100 | 1381 | 73 | 227 |
| **UKRAINE** | | | | |
| **EN7Z** | **4,157,576** | **3557** | **156** | **577** |
| **UT7L** | **3,661,852** | **3048** | **160** | **604** |
| UR4IZA | 1,703,844 | 2032 | 123 | 441 |
| USØQ | 1,499,005 | 1868 | 112 | 397 |
| UR4LWY | 297,501 | 480 | 90 | 303 |
| UZ4E | 149,150 | 409 | 53 | 137 |
| UR4MWU | 60,152 | 323 | 43 | 142 |
| UR4PWC | 42,614 | 198 | 42 | 107 |
| UU5A | 26,412 | 198 | 19 | 43 |
| **YUGOSLAVIA** | | | | |
| **4N1N** | **1,651,056** | **2517** | **110** | **418** |
| YU1ANT | 146,050 | 685 | 29 | 98 |
| **OCEANIA** | | | | |
| **EAST MALAYSIA** | | | | |
| **9M6A** | **1,135,260** | **1636** | **112** | **206** |
| **SOUTH AMERICA** | | | | |
| **ARGENTINA** | | | | |
| **AY1DZ** | **3,270,945** | **2743** | **113** | **324** |
| AY8XW | 585,178 | 1758 | 35 | 99 |
| **BRAZIL** | | | | |
| **PP2CW** | **178,704** | **374** | **71** | **148** |
| PY3MHZ | 12,096 | 166 | 12 | 15 |
| **SOUTH SHETLAND ISLANDS** | | | | |
| **R1ANF** | **1,796,708** | **2189** | **96** | **218** |
| **MULTI-OPERATOR TWO TRANSMITTER** | | | | |
| **NORTH AMERICA** | | | | |
| **UNITED STATES** | | | | |
| **KØTV/1** | **3,082,379** | **1781** | **149** | **534** |
| N1RR | 1,971,333 | 1371 | 134 | 475 |
| W1SRG | 1,351,566 | 1157 | 114 | 372 |
| W1NR | 799,638 | 624 | 112 | 370 |
| **N2NU** | **7,968,972** | **3914** | **167** | **636** |
| **N3RS** | **9,291,537** | **4377** | **174** | **663** |
| **K4JA** | **14,084,994** | **5748** | **182** | **721** |
| N4WW | 7,020,125 | 3576 | 168 | 623 |
| N4RV | 6,426,765 | 3174 | 161 | 604 |
| N4TO | 5,791,575 | 3154 | 164 | 611 |
| K4EA | 5,228,844 | 2683 | 166 | 596 |
| **W6OAT** | **2,495,740** | **1666** | **156** | **424** |
| N7MH/6 | 2,405,634 | 1597 | 153 | 421 |
| NT6K | 1,863,868 | 1556 | 144 | 380 |
| K6CEO | 52,124 | 162 | 64 | 102 |
| **W8AV** | **6,177,600** | **3029** | **168** | **632** |
| K8LX | 6,067,320 | 3135 | 158 | 586 |
| **NØNI** | **6,112,884** | **3244** | **171** | **602** |
| **BAHAMAS** | | | | |
| **C6AKP** | **2,040,324** | **2810** | **100** | **277** |
| **CANADA** | | | | |
| **VE1JF** | **9,889,101** | **6128** | **148** | **555** |
| VE3DC | 5,055,608 | 3395 | 144 | 508 |
| **DOMINICA** | | | | |
| **J75A** | **13,051,120** | **8572** | **144** | **512** |
| **U.S. VIRGIN ISLANDS** | | | | |
| **WP2Z** | **13,719,544** | **8233** | **151** | **567** |
| **AFRICA** | | | | |
| **GAMBIA** | | | | |
| **C53M** | **21,161,637** | **10774** | **167** | **604** |
| **MADEIRA ISLANDS** | | | | |
| **CT9L** | **20,941,492** | **9192** | **162** | **644** |
| **TUNISIA** | | | | |
| **3V8BB** | **22,702,797** | **10549** | **171** | **622** |
| **ASIA** | | | | |
| **ASIATIC RUSSIA** | | | | |
| **RK9CWW** | **7,200,208** | **3848** | **156** | **571** |
| RKØAYB | 6,600,559 | 4595 | 156 | 523 |
| **KUWAIT** | | | | |
| **9K9X** | **9,520,140** | **5934** | **148** | **517** |
| **UNITED ARAB EMIRATES** | | | | |
| **A61AJ** | **24,384,292** | **10505** | **194** | **704** |
| **EUROPE** | | | | |
| **ALBANIA** | | | | |
| **ZA1B** | **7,956,520** | **7984** | **142** | **534** |



*Juan, EA5XQ, operated QRP from Monterey, Mexico.*

| | | | | |
|---|---|---|---|---|
| **BALEARIC ISLANDS** | | | | |
| **EA6/DL1GGT** | **1,966,914** | **3894** | **93** | **321** |
| **EUROPEAN RUSSIA** | | | | |
| **RU1A** | **14,817,880** | **7811** | **194** | **758** |
| **FRANCE** | | | | |
| **TM5HV** | **20,564** | **393** | **49** | **145** |
| **GERMANY** | | | | |
| **DAØFF** | **4,105,075** | **3099** | **148** | **595** |
| DLØKF | 2,379,666 | 2614 | 122 | 491 |
| **HUNGARY** | | | | |
| **HG6N** | **10,580,810** | **6886** | **178** | **703** |
| **KALININGRAD** | | | | |
| **RW2F** | **14,122,368** | **8132** | **189** | **747** |
| **LITHUANIA** | | | | |
| **LY1YK** | **5,963,078** | **4779** | **167** | **636** |
| **LUXEMBOURG** | | | | |
| **LX5A** | **11,072,448** | **7785** | **160** | **658** |
| **NORTHERN IRELAND** | | | | |
| **GI5W** | **12,185,760** | **8381** | **165** | **683** |
| **POLAND** | | | | |
| **SO6Y** | **1,661,688** | **1995** | **125** | **463** |
| **SWEDEN** | | | | |
| **SKØX** | **2,755,585** | **3525** | **129** | **472** |
| **UKRAINE** | | | | |
| **UU7J** | **6,436,200** | **5231** | **177** | **673** |
| **OCEANIA** | | | | |
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| **AH2R** | **11,311,266** | **6390** | **171** | **482** |
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| **ZL6QH** | **8,753,363** | **5908** | **147** | **382** |
| **SOUTH AMERICA** | | | | |
| **ARGENTINA** | | | | |
| **LT1F** | **8,621,878** | **6017** | **142** | **424** |
| LT4O | 633,290 | 1112 | 78 | 140 |
| **BRAZIL** | | | | |
| **PY2TEL** | **304,848** | **1036** | **47** | **99** |
| **PARAGUAY** | | | | |
| **ZP6T** | **7,656,656** | **5200** | **138** | **410** |
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| **NORTH AMERICA** | | | | |
| **UNITED STATES** | | | | |
| **KC1XX** | **19,499,520** | **7678** | **194** | **766** |
| **W3LPL** | **17,219,015** | **7264** | **189** | **740** |
| **N2RM** | **14,162,176** | **6135** | **181** | **715** |
| **NY4A** | **13,013,729** | **6048** | **175** | **664** |
| **K9NS** | **12,647,245** | **5551** | **195** | **700** |
| **K1TTT** | **9,411,944** | **4601** | **169** | **652** |
| N1IX | 8,785,840 | 4691 | 165 | 647 |
| W3PP | 8,766,506 | 4204 | 172 | 646 |
| KB1H | 8,612,217 | 4417 | 160 | 623 |
| **K8CC** | **8,520,784** | **4137** | **180** | **658** |
| W4MYA | 8,452,864 | 4109 | 176 | 672 |
| N3AD | 8,447,780 | 4322 | 169 | 648 |
| K2LE | 8,415,651 | 4139 | 163 | 610 |
| **KØRF** | **8,310,831** | **4082** | **187** | **644** |
| **K5GO** | **7,012,717** | **3793** | **177** | **634** |
| WØAIH | 6,049,458 | 3207 | 170 | 613 |
| **N6AW** | **5,580,582** | **3031** | **177** | **565** |
| K3II | 3,670,272 | 2150 | 149 | 559 |
| W2YC | 2,780,373 | 1560 | 151 | 568 |
| AK3Z | 2,077,714 | 1495 | 130 | 432 |
| K3DI | 2,063,036 | 1253 | 136 | 498 |

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| **VE3QDR** | **131,334** | **476** | **56** | **121** |
| **GRENADA** | | | | |
| **J3A** | **20,150,950** | **11763** | **166** | **619** |
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| **BURKINA FASO** | | | | |
| **XT2DX** | **35,221,070** | **14839** | **180** | **685** |
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| **ASIA** | | | | |
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| **JA5BJC** | **11,911,692** | **6179** | **187** | **567** |
| **JA3YBK** | **9,436,875** | **5064** | **179** | **540** |
| **EUROPE** | | | | |
| **CROATIA** | | | | |
| **9A1A** | **17,255,246** | **10875** | **193** | **736** |
| **CZECH REPUBLIC** | | | | |
| **OL5T** | **6,695,024** | **5005** | **154** | **637** |
| OK7K | 1,398,782 | 1937 | 99 | 335 |
| **DENMARK** | | | | |
| **OZ5W** | **4,862,211** | **3405** | **147** | **610** |
| **OZØXX** | **4,471,768** | **4697** | **138** | **520** |
| **FINLAND** | | | | |
| **OH2K** | **1,585,490** | **1956** | **105** | **374** |
| **GERMANY** | | | | |
| **DFØHQ** | **16,336,230** | **9498** | **189** | **766** |
| **LITHUANIA** | | | | |
| **LY7A** | **9,854,838** | **7232** | **172** | **665** |
| **POLAND** | | | | |
| **SN4L** | **3,183,831** | **3632** | **136** | **543** |
| **SCOTLAND** | | | | |
| **GM7V** | **10,353,582** | **8180** | **162** | **647** |
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| **PT5A** | **28,634,736** | **12368** | **186** | **686** |
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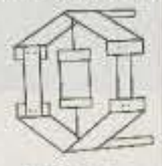

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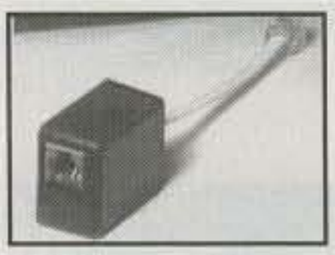

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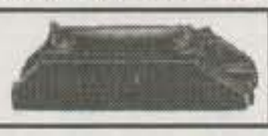

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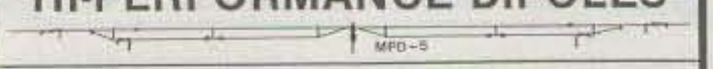


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